

the TOOL ENGINEER

March 1955



LOS ANGELES

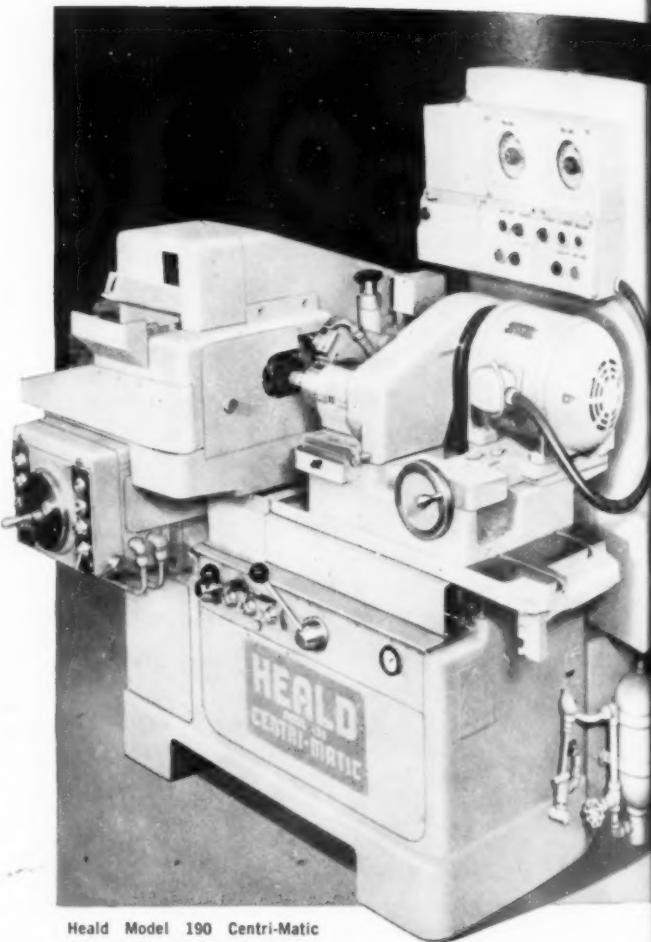
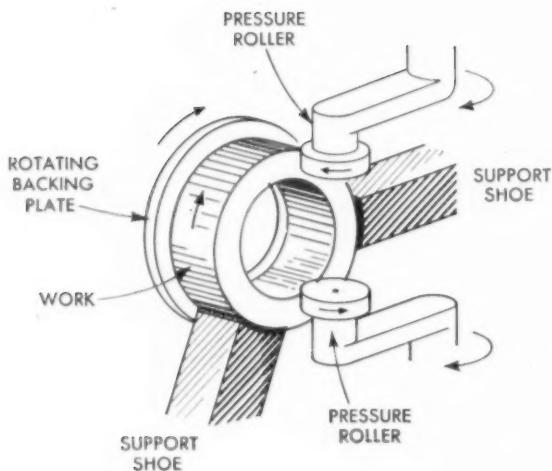


WESTERN Industrial Exposition and Convention

PUBLICATION OF THE AMERICAN SOCIETY OF TOOL ENGINEERS

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Now thoroughly field tested and proved in service, the new Centri-Matic joins the Heald line of fully automatic centerless internals.

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Heald Model 190 Centri-Matic
for small to medium-sized parts.

are designed primarily to operate with central hydraulics in battery setups. Centri-Matic machines are furnished with belt or high-frequency wheelhead drive and with Size-Matic or Gage-Matic sizing method. For complete details, write for Bulletin No. 2-190-1.

The new Centri-Matic is another good reason why
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Cover: Attention of tool engineers is dramatically focussed on Los Angeles. There, the first ASTE Western Industrial Exposition and Convention will be held during the week of March 14. Latest developments in tools, tooling, materials and methods will be displayed and demonstrated by more than 275 firms.



The Tool Engineer

Volume XXXIV, No. 3

March 1955

**TECHNICAL
ARTICLES**

Congratulations West Coast!	By Joseph P. Crosby	69
Opportunities in Tool Engineering	By Ralph H. Eshelman	71
Gadgets		76
Precision Production of Small Parts	By Henry De Coursey	79
LeadscREW Pilot for Acme Tapping	By Ernest H. Romine	81
Designed for Production		84
Tooling for Door Locks	By Louis A. Talamini	86
Tools at Work		90
Welding Repair Prevents Costly Shutdown	By William G. Burge	92
Ceramics Prove Useful in Tooling	By Robert F. Rea	95
Drilling Research Points to Production Improvements	By Carl J. Oxford, Jr.	99
Clamped Chip Breakers—Their Advantages and Design	By Erik K. Henriksen	103
Interchangeability of Stock in Die Sets (Reference Sheet)		109

**EXPOSITION
SECTION**

Significant Products To Be Displayed		111
Exposition Floor Plan		130
Exhibitors and Products Displayed		132

ASTE NEWS

Featured This Month (Index)		144
Western Welcome Awaits ASTE Convention	By Nancy M. Houston	145
Convention Program		148
ASTE Aloha		153
Technical Conferences		154
Plant Tours		158
Women's Activities	By Edith R. Saunders	160
Host Committee		162

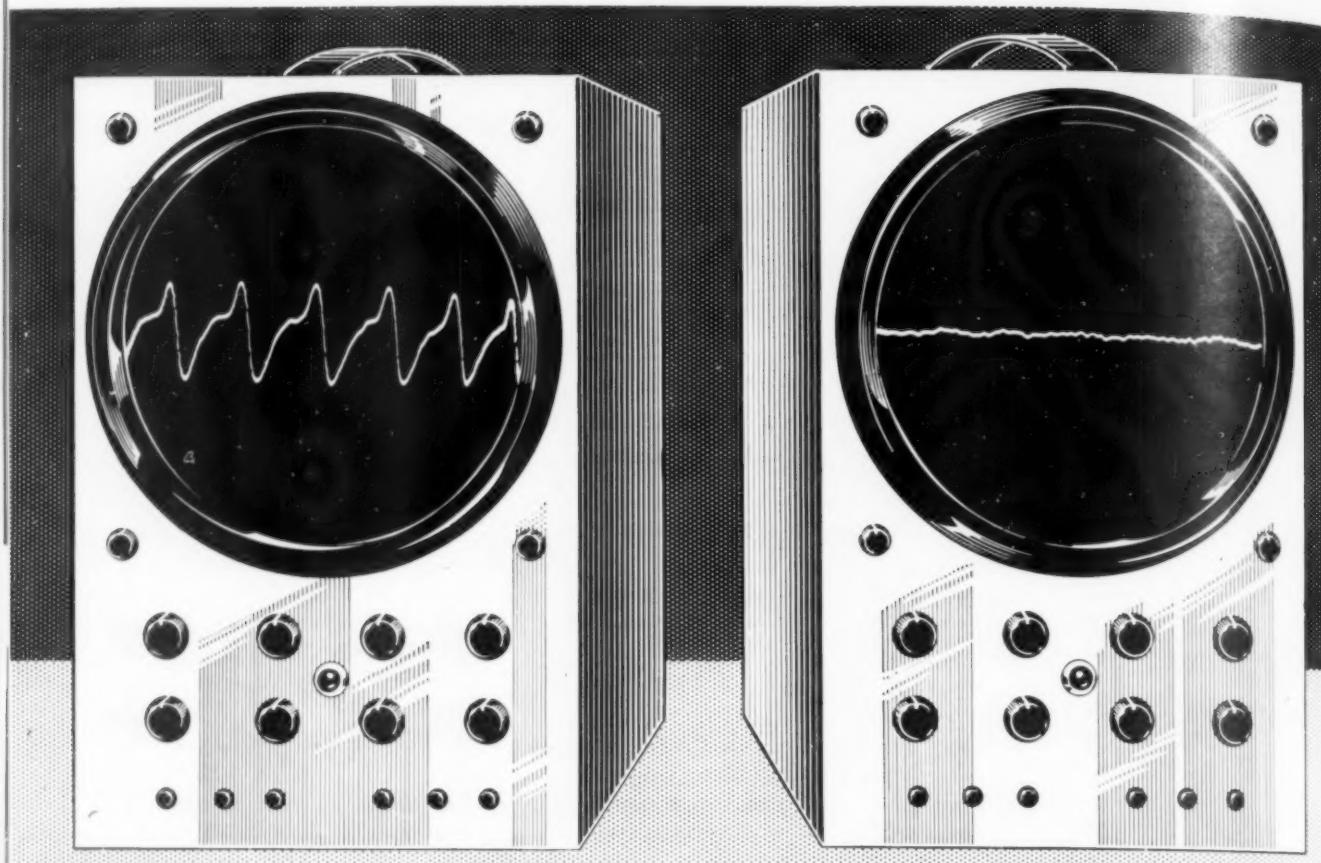
DEPARTMENTS

Abstracts of Foreign Literature	235	Technical Digests	239
Field Notes	211	Technical Shorts	223
Good Reading	233	Tools of Today	181
Letter from the Editor	3	Trade Literature	225
Men at Work	220	Who's Meeting—and Where	217
Progress in Production	177	Advertisers' Index	395

THE TOOL ENGINEER is regularly indexed in the
Engineering Index Service and the *Industrial Arts Index*



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and were obtained under identical conditions.

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Circulation Manager

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Executive & Editorial Offices:
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The Tool Engineer

Your Preview in Print

Because the Society's first Western Industrial Exposition and Convention will be in Los Angeles during the week of March 14, this issue contains several special features heralding this event. For those planning to attend the show and meeting, the preview will assist in organizing precious time to best advantage. For those not attending, it will be helpful in indicating the types of equipment on display and the subjects of the technical papers and conferences.

Beginning with the cover, which portrays engineers' interest focused on California, the entire issue is keyed to the Convention theme. In the technical section, four articles on specialized tooling methods are authored by West Coast engineers. Also, three Convention papers are abstracted, serving as preprints and indicating the quality of the important subjects to be discussed during the week.

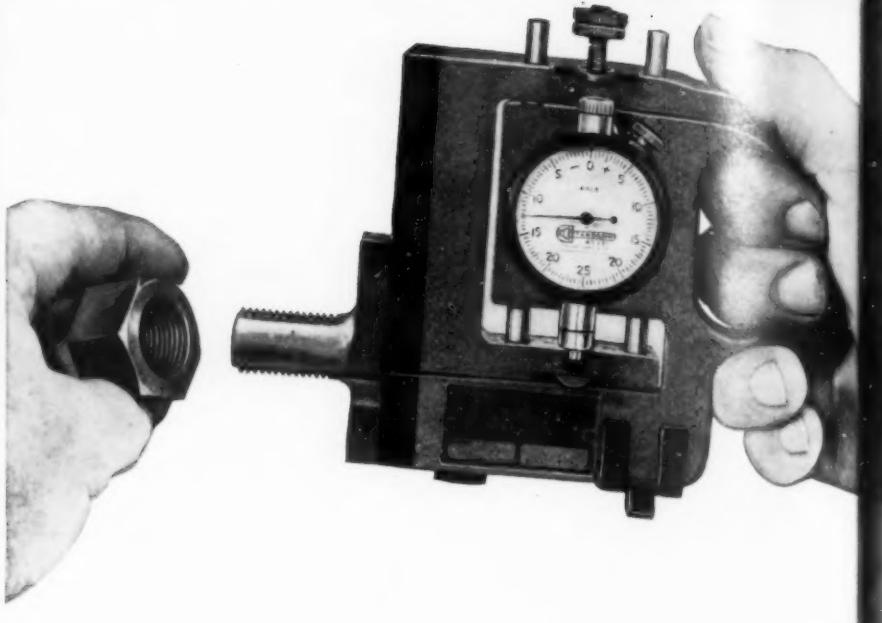
Following the technical articles is the Exposition preview. In addition to floor plans and a directory of more than 275 exhibitors, typical products are discussed and illustrated in a classified presentation. Actually an exposition guide, the directory contains the latest information at the time of printing.

Complete program for each day of the Convention is published in the News section. Subject for each paper and panel are listed together with authors and panel members.

Other highlights of the meeting, such as ladies' activities and plant tours, are also included. The entire week is packed with worthwhile and informative material especially tailored to the interests of tool engineers to serve industry and the public.

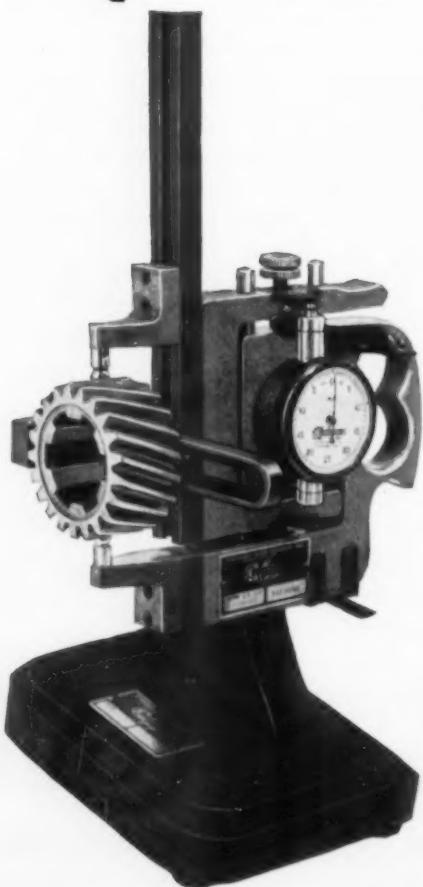
John W. Greve
EDITOR

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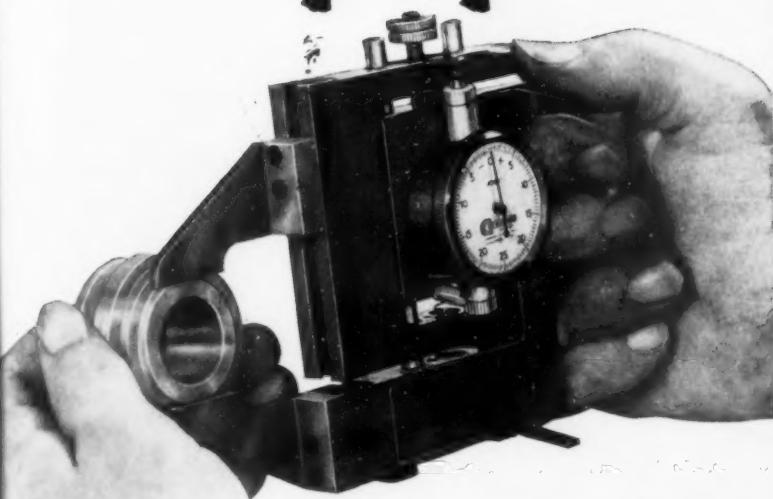
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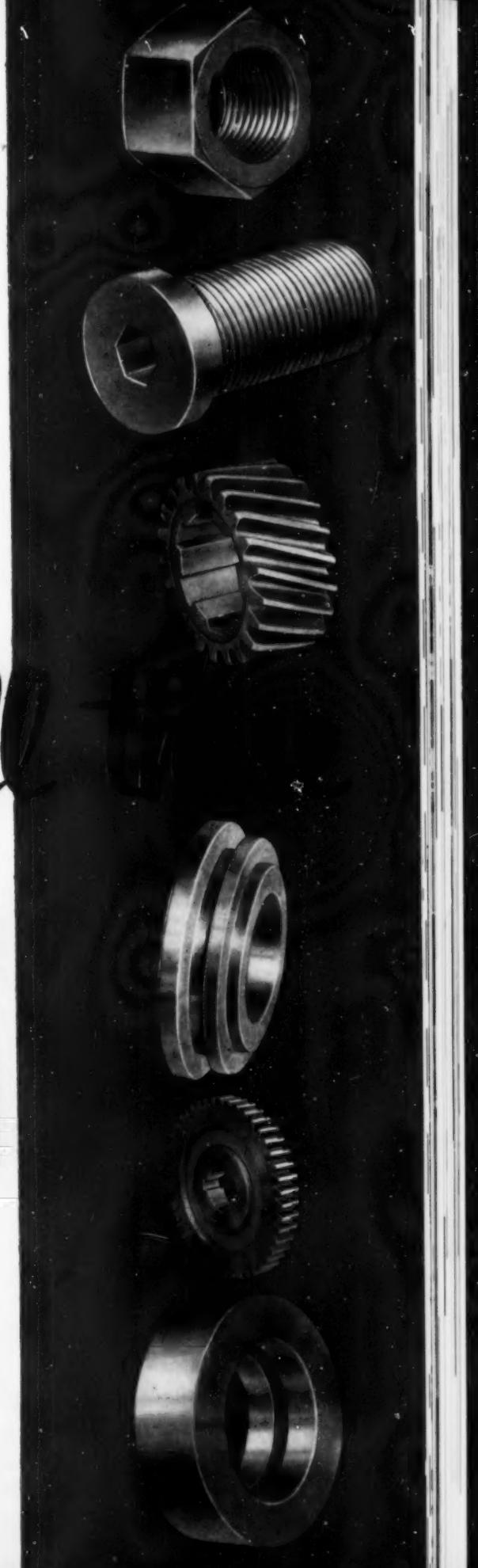
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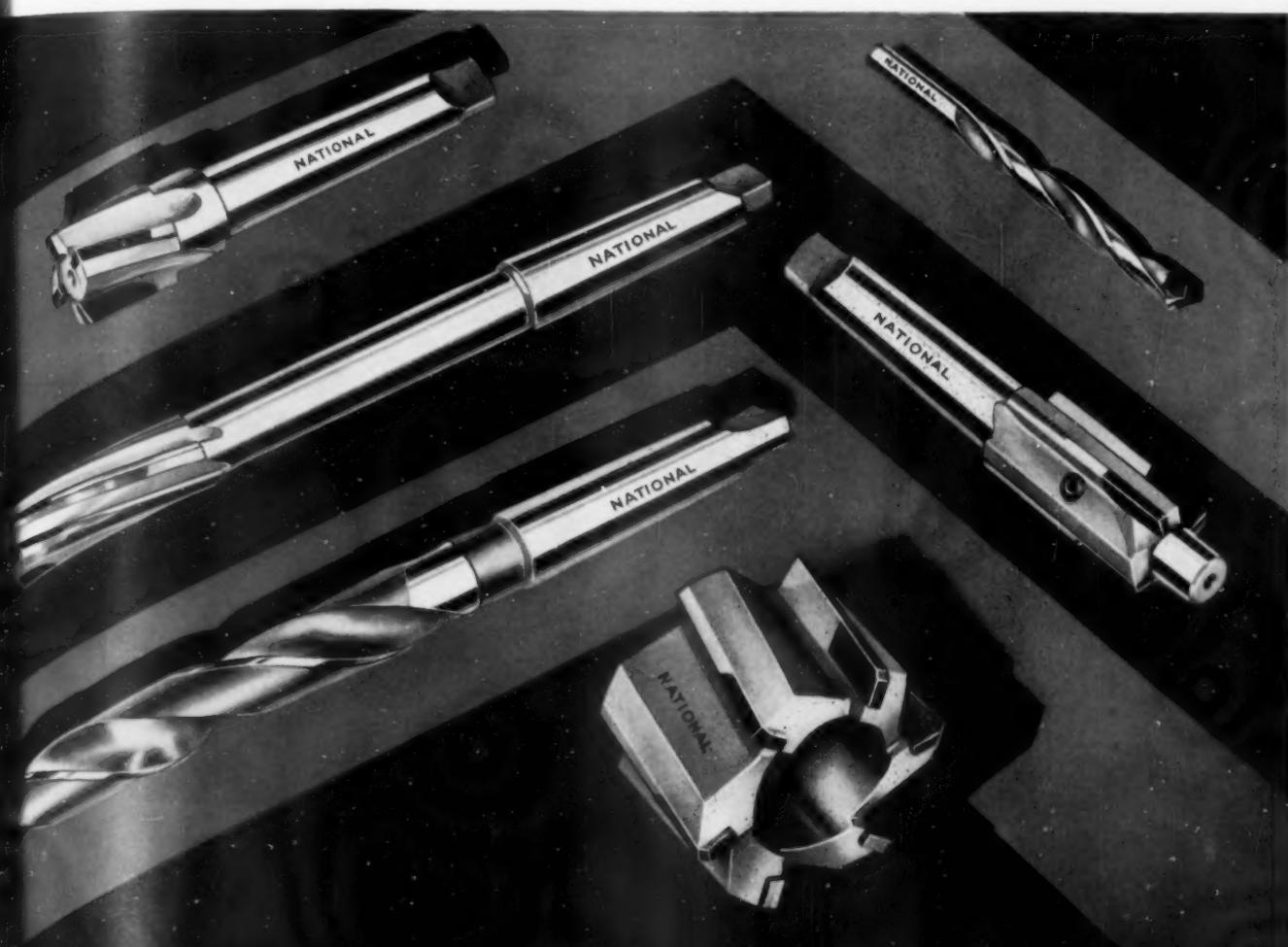
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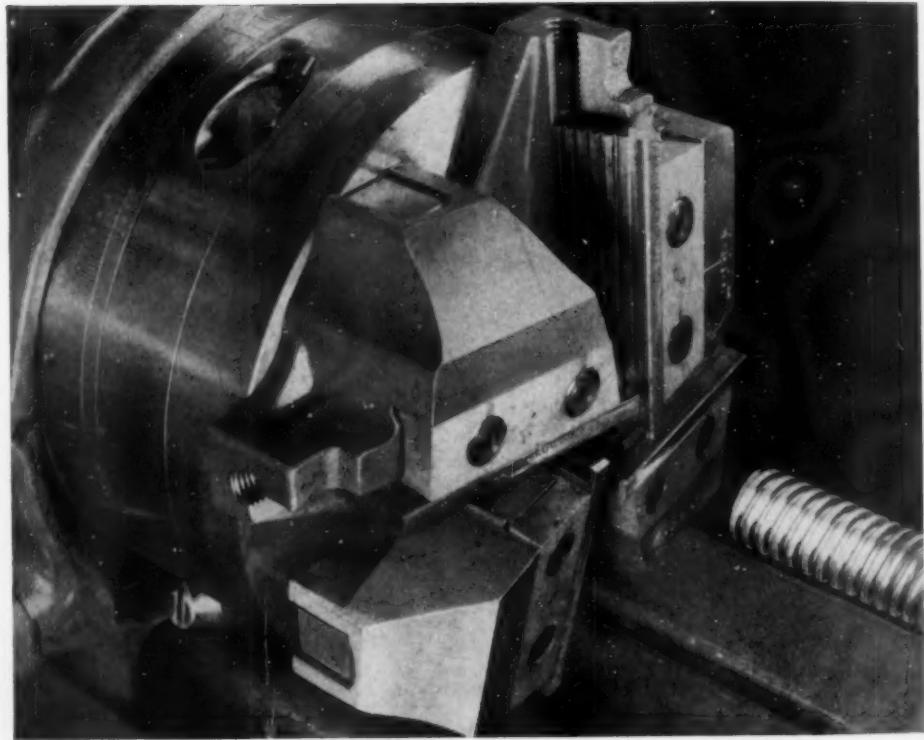
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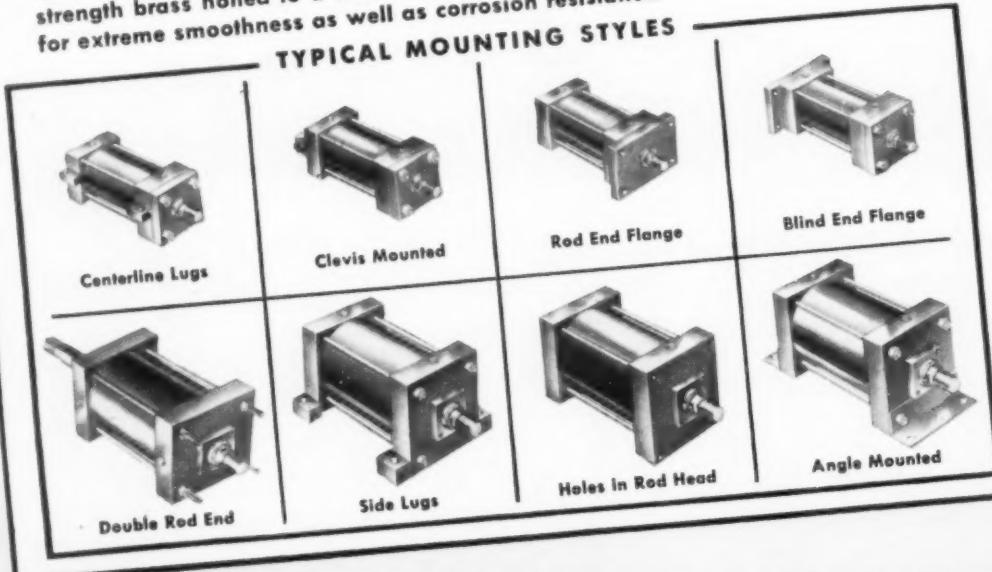
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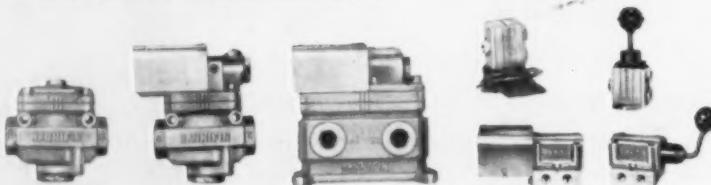


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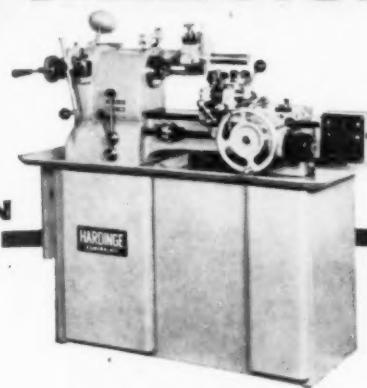
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with Threading Head

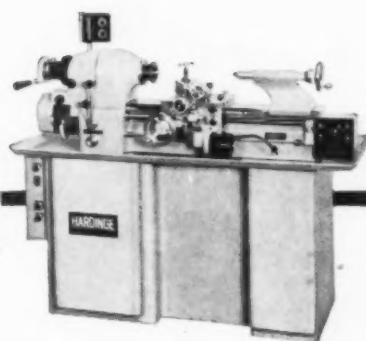


Model TFB
Turning, Facing
and Boring Machine

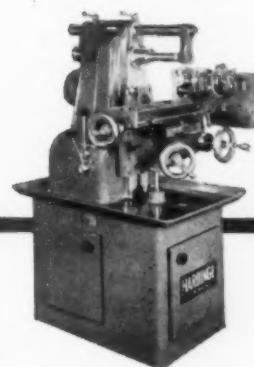


Model DSM59
Second
Operation Machine

TOOL ROOM MACHINES



Model HLV
Tool Room Lathe



Model UM
Universal Milling Machine



Model DV59
Lathe

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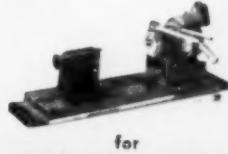
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for
Tool Room



for
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for
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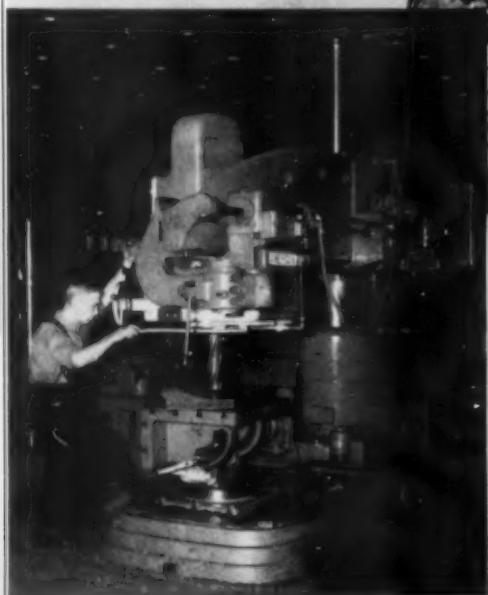
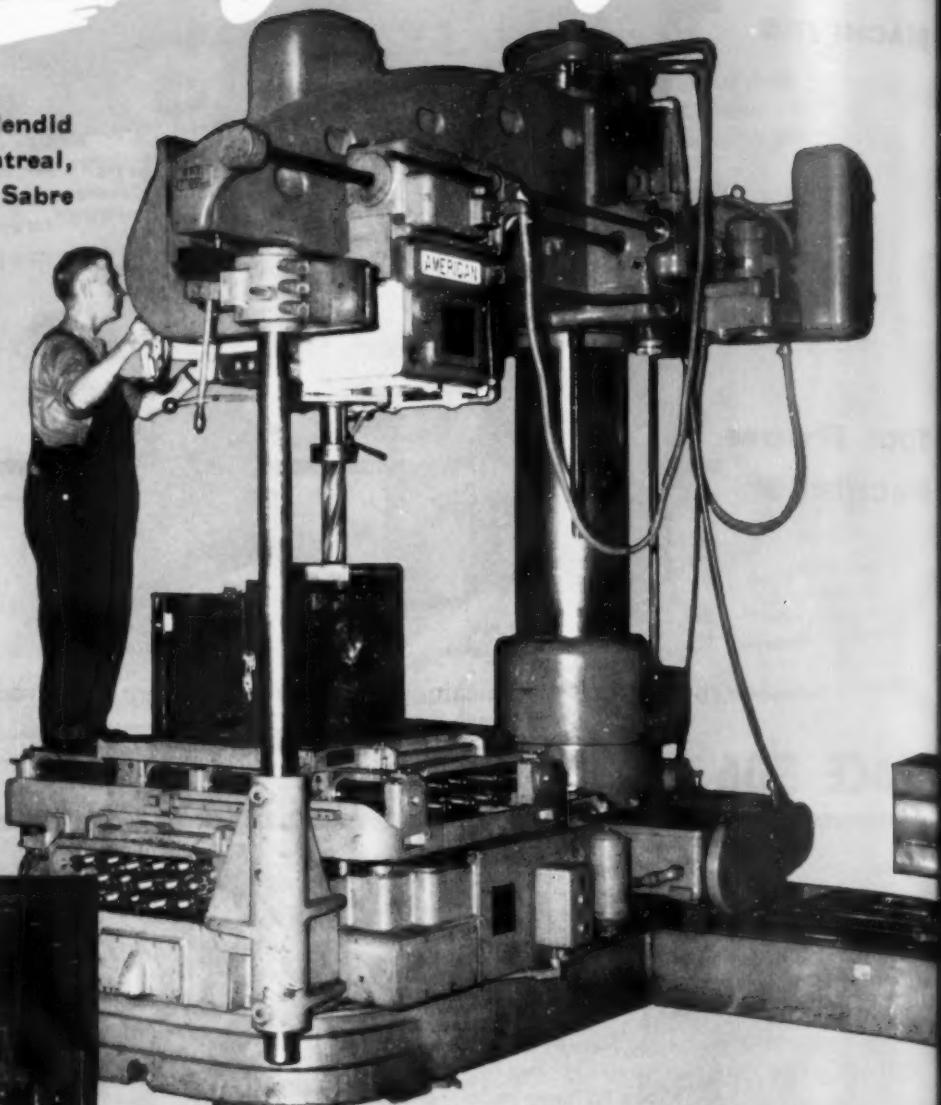
COLLET INDEX FIXTURES

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On TOP of his job!

This operator is doing a splendid job at Canadair Limited, Montreal, on the production of F-86E Sabre Jets for the RCAF and, as the illustration shows, he is right on top of his job, too.

He is proud of his fine new 6' 17" column "AMERICAN" Hole Wizard Radial. "It's powerful; it's sturdy; it's easy to operate, and I'm not worn out at the end of the day". What more could any operator ask? As a consequence he turns out a lot of fine work which makes his machine a paying investment for the company.



This "American" Hole Wizard Radial has a right angle base, on one wing of which is mounted a Bullard Man-Au-Trol Spacer—as shown by the illustration.

"AMERICAN" Hole Wizard Radials are playing a prominent part in the production of critical defense items for both the U. S. A. and Canada.

For a complete revelation of their virtues send for descriptive bulletin No. 327.

THE AMERICAN TOOL WORKS CO.

Cincinnati 2, Ohio, U. S. A.

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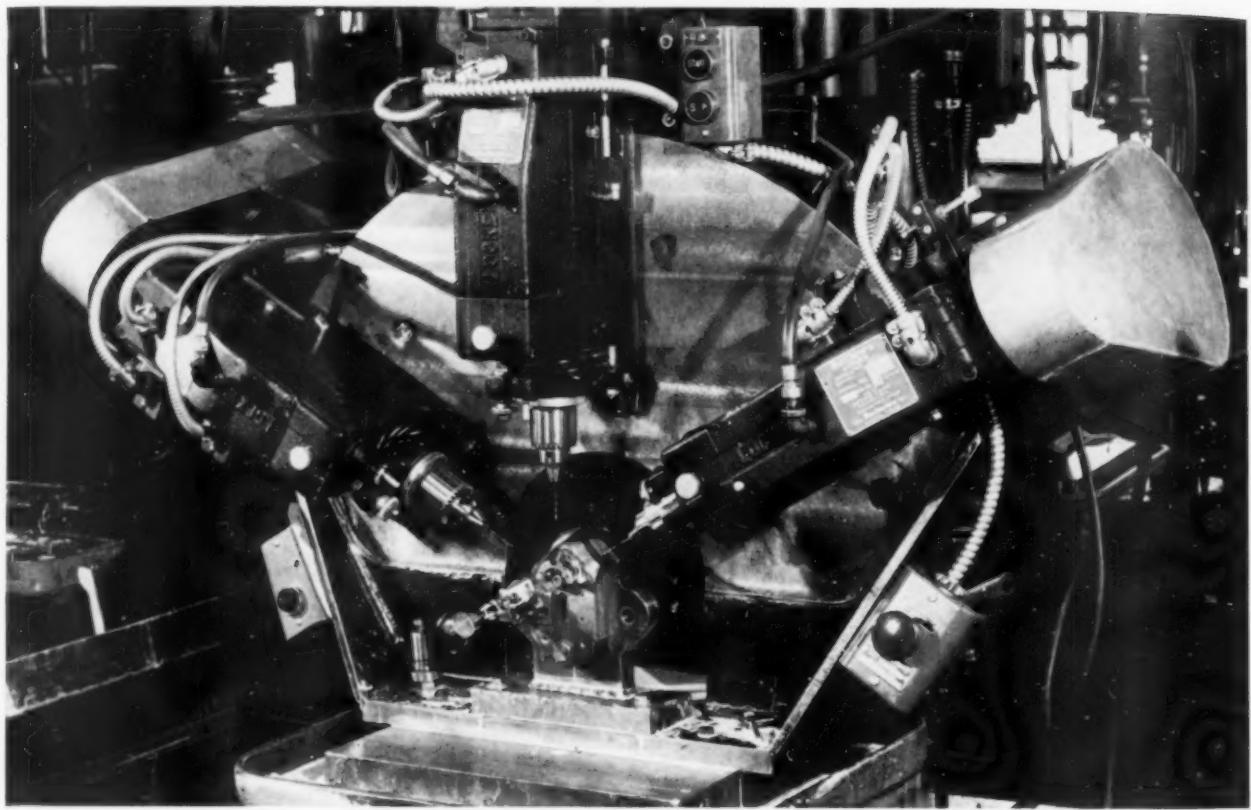
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The Case of The Bellows Co.
VERSUS
The High Cost of Drilling Holes

Testimony taken by tape recording in the plant of
██████████, Detroit, Michigan

Operation: Drilling $\frac{1}{4}$ " holes in hex head aircraft bolts on a
tool-room-built machine, using three Bellows-Locke Drill Units



1102A

Statement of ██████████, General Superintendent

- Q. How was this operation performed before you built this special machine?
- A. We drilled on a single spindle by hand, with an index fixture to locate the three stations. However, it was difficult to hold a true position and the hole did not come through parallel from one end to another.
- Q. Why wouldn't it come through parallel?
- A. On account of feed and speed. The feed had to be controlled by hand.
- Q. The old way, besides hand feeding, you would have to hand index the part?
- A. Right. We had to index every time we drilled a hole.
- Q. Can you give me a comparison of production rates on the old method and on this machine?
- A. We increased almost 50%.
- Q. What is the highest rate of production you get on this machine?
- A. Somewhere around 240 pieces per hour.

- Q. What other advantages have you found? You get a good deal less spoilage on finished parts, don't you?
- A. Yes, considerably. We hardly get any spoilage at all now.
- Q. On the old method, did you need to use a skilled operator?
- A. Well, he had to know something about it in order to handle the drill carefully. When we're using a No. 60 drill, it does require a person that knows how to handle it.
- Q. On this machine, you just use a girl operator, don't you?
- A. That's all—the machine takes anybody as long as they can put a part in and press the button and take the part out.
- Q. How long has this machine been in operation in your shop?
- A. I can't tell exactly—about six months or more.
- Q. Has it been working every day?
- A. 9 hours a day, 5 days, sometimes 6 days, a week.

- Q. Do you have other Bellows equipment in your plant here?
- A. We have two infeeds on centerless grinders; we have all our milling machines operated by Bellows Air Motors vises operated by Air motors; also on Dearborn fixtures which we index; as well as Air Motors on collets—it's all Bellows operated.
- Q. Do you find this equipment adaptable for use on other machine tools?
- A. Yes, we find it can be used on any machine.
- Q. How long have you been using Bellows equipment here?
- A. Ever since I remember—around 1945 or '46, during the last war.
- Q. Do you have any of those 'old' Bellows Air Motors around here now?
- A. Yes, we have quite a few—a number of them were destroyed in 1948 when we had a fire, but after the fire we were able to overhaul them and put them back on the machines.
- Q. You mean you put them in operation after they were damaged in the fire?
- A. That's right.
- Q. Are they still working?
- A. Some of them are still working.
- Q. They must be about 10 years old now?
- A. Yes, they must be.

Statement of [REDACTED], Machine Operator

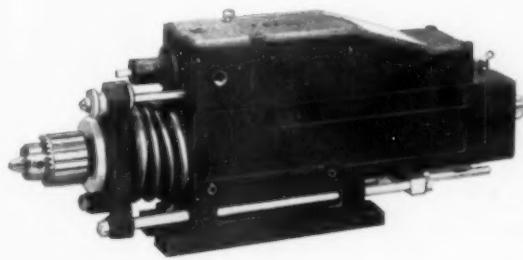
Q. [REDACTED], how long have you worked here?

A. Eight months.

- Q. Did you do this operation on the old machine where you had to do it by hand?
- A. Yes, sir.
- Q. Could you tell me a little bit about that?
- A. Well, it was not as easy to work as this new machine.
- Q. Why was it hard to work on the old machine?
- A. Well, you had to turn it every time you drilled and on the automatic, it turns by itself.
- Q. And each time you turned it, did you have to pull the drill down?
- A. Yes, we had to pull the drill down each time we drilled a hole.
- Q. Did your shoulders get tired?
- A. Oh, yes. It made your arms and shoulders awfully tired.
- Q. Did you have to take any rest periods on the old machine?
- A. Yes, because my arms would get so tired I couldn't keep on working.
- Q. How often would you have to rest?
- A. About twice during the morning.
- Q. When you'd go out to lunch after working on this old machine—did your arms get stiff or anything like that?
- A. Yes, at night—especially when I'd quit work, they'd get awful stiff.
- Q. What did you do for it?
- A. Rub them and bathe them and that's about all, I guess. Then do it again the next day.
- Q. I imagine you like this new operation pretty well?
- A. Oh, yes, I like this fine.

The electrically driven spindle is fed by air power up to the work at which point hydraulic feed control takes over. Built-in speed controls permit regulation of rapid traverse. Drill depth adjustable up to 3". Drilling capacity up to $\frac{3}{8}$ " in mild steel. All controls are built-in. Valving is electrically actuated. Depth accuracy .005" (with optional electric depth control .001"). Optional deep hole drilling controls. Available in three types: pulley driven, in-line direct motor drive, or parallel mount motor drive. Also available with reversing motor for direct tapping operations.

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Describes the Bellows-Locke Drill Unit in detail—shows how and where it can be used to best advantage. Free on request. Address: The Bellows Co., Dept. TE355, Akron 9, Ohio.

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TE355



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Here's a typical case where a shaft with ground surfaces was driven at a speed of 1750 r.p.m. The oil seals created enough heat to burn the shaft and stop the motor. To make matters worse, it was found that twice the original speed was necessary. So, the oil seal surfaces were *Superfinished*, and the shaft operated at a speed of 3500 r.p.m. With the *Superfinished* surfaces, no heat was developed at this higher speed. No further trouble was encountered.

Superfinishing is a quick, simple and inexpensive process. Oil seal surfaces are but one of the many applications where it can save you money. Not only can it eliminate trouble, but often it can help you reduce manufacturing costs. Gisholt engineers can advise you regarding its applications.

Write now for the booklet
"Wear and Surface Finish."

Superfinished ▶

◀ **Superfinished**

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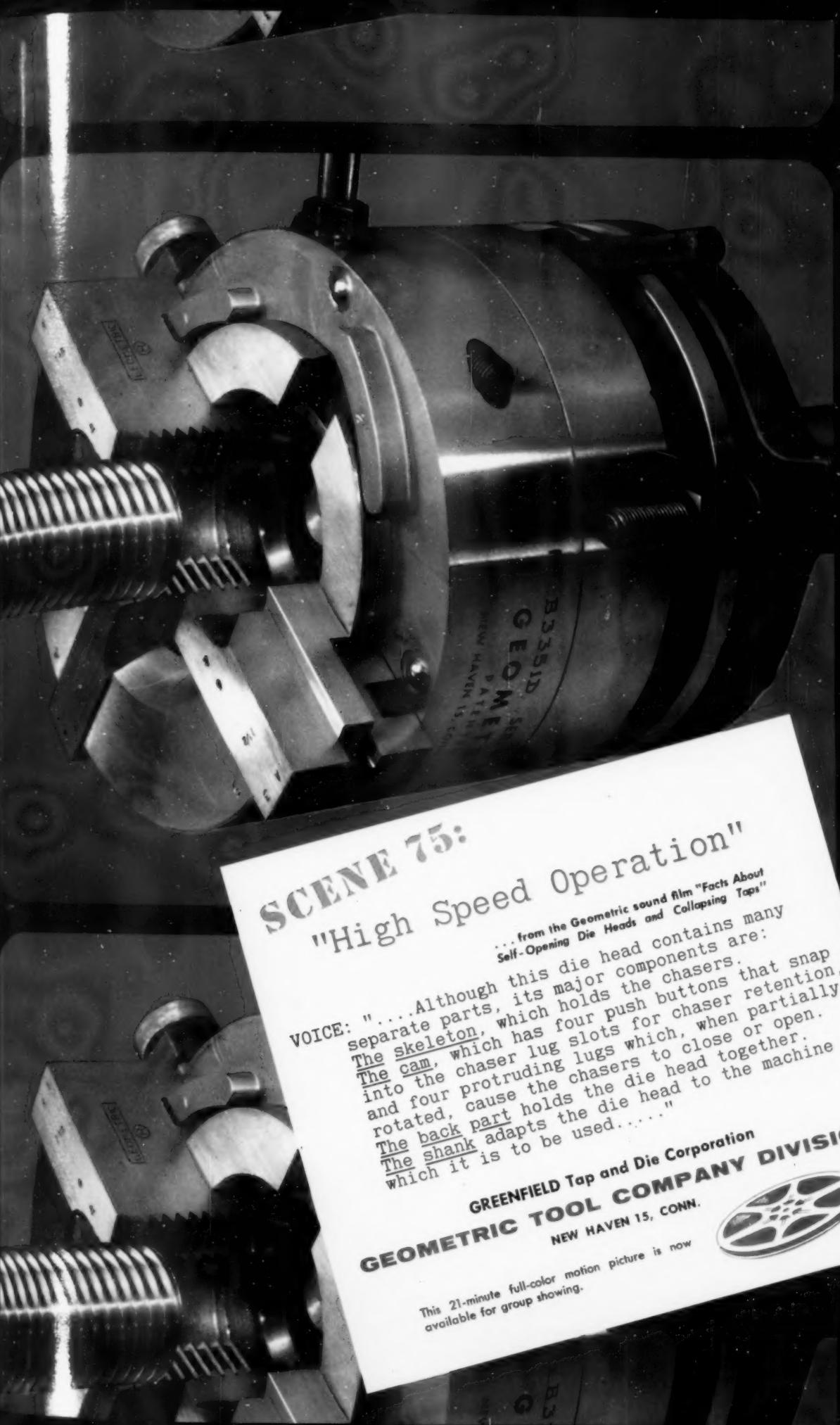
MACHINE COMPANY

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES



THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



SCENE 75:
"High Speed Operation"

VOICE: "....Although this die head contains many separate parts, its major components are:
The skeleton, which holds the chasers.
The cam, which has four push buttons that snap into the chaser lug slots for chaser retention.
and four protruding lugs which, when partially rotated, cause the chasers to close or open.
The back part holds the die head to the machine in which it is to be used...."

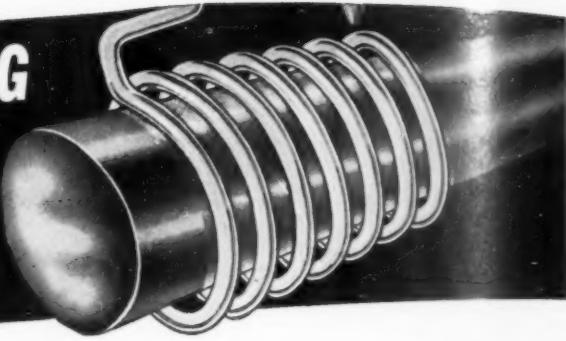
...from the Geometric sound film "Facts About Self-Opening Die Heads and Collapsing Taps"

GREENFIELD Tap and Die Corporation
GEOMETRIC TOOL COMPANY DIVISION
NEW HAVEN 15, CONN.

This 21-minute full-color motion picture is now available for group showing.



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BRAZING

Permits widest choice of silver or copper brazing alloys from lowest to highest melting points. Ideal for brazing carbide tips.

HEATING

Heat localized exactly where wanted at desired temperature. Ideal for gears, cams, bearing surfaces, cutting tools and other areas that are subject to wear.

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Speedily and neatly performs intricate soldering applications with or without the use of preformed rings.

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Ideal for annealing, stress-relieving, normalizing or pre-heating selected areas.

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Readily melts quantities of ferrous and non-ferrous metals in either graphite or ceramic crucibles.



2½ KW INDUCTION HEATING UNIT



30 KW INDUCTION HEATING UNIT



100 KW INDUCTION HEATING UNIT

LEPEL Electronic Tube GENERATORS
1 KW; 2½ KW; 5 KW; 10 KW; 20 KW;
30 KW; 50 KW; 75 KW; 100 KW.

LEPEL Spark Gap Converters
2 KW; 4 KW; 7½ KW; 15 KW; 30 KW.

All Lepel equipment is certified to comply with the requirements of the Federal Communications Commission.

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Induction
HEATING UNITS**

The Lepel line of induction heating units represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating. With a background of half a century of electrical and metallurgical experience, the name Lepel has become the symbol for quality in induction heating equipment embodying the highest standards of engineering achievement, dependable low cost operation and safety.

If you are interested in the application of induction heating you are invited to send samples of the work with specifications of the operations to be performed. Our engineers will process these samples and return the completed job with full data and recommendations without any cost or obligation.

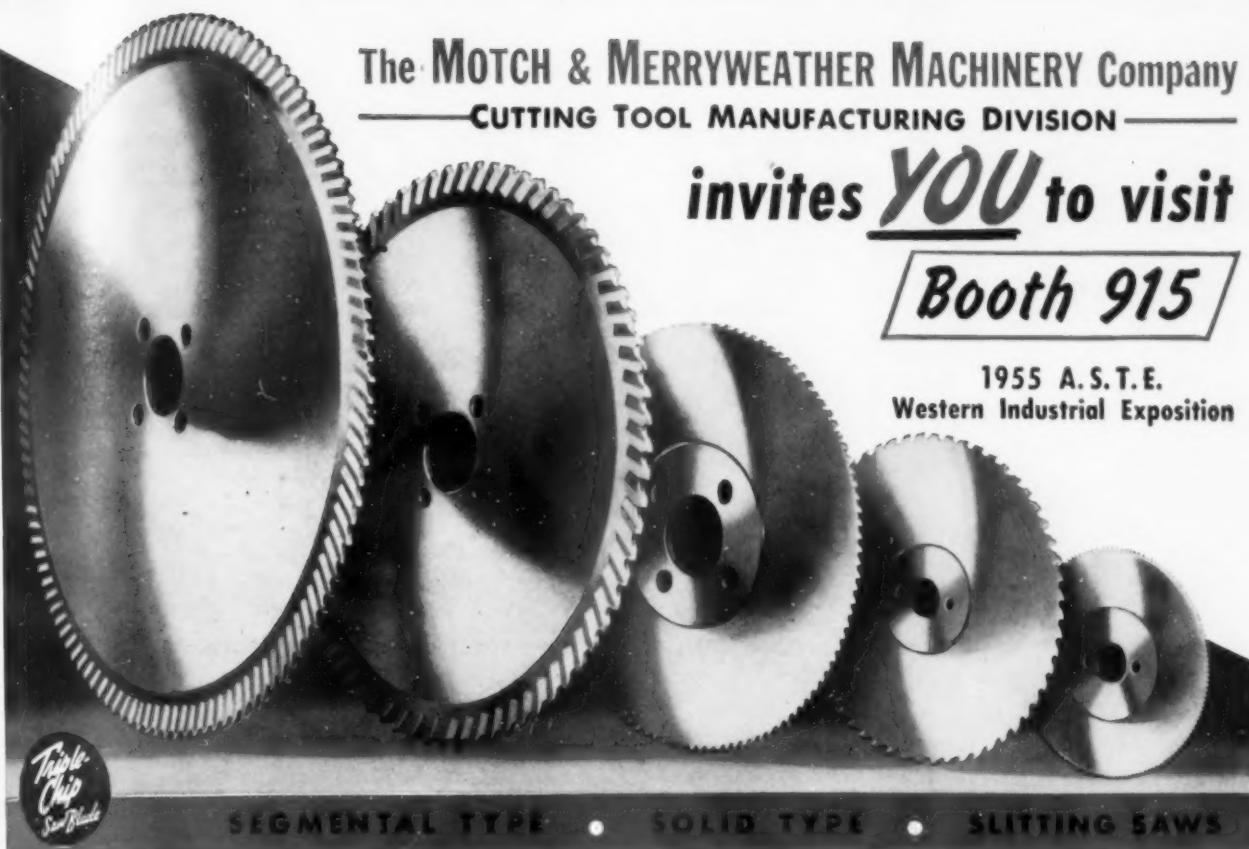
WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information on high frequency induction heating.

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CUTTING TOOL MANUFACTURING DIVISION

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saws — for any machinable material, ferrous or non-ferrous, any size, any shape, any thickness. Ask how the M & M Triple-Chip Method reduces tooth strains, prolongs blade life and speeds production with accuracy.



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Triple C® grinding coolant makes for improved results and lower costs on all wet grinding. Transparent, stable solutions; maximum cooling; grinding wheels stay clean and free-cutting.

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M & M Heavy Duty Anti-Weld Soluble Oil lengthens tool life, especially under severe conditions. Deters "pick-up", cuts rejects, is oily (not greasy), odorless; lowers production costs.

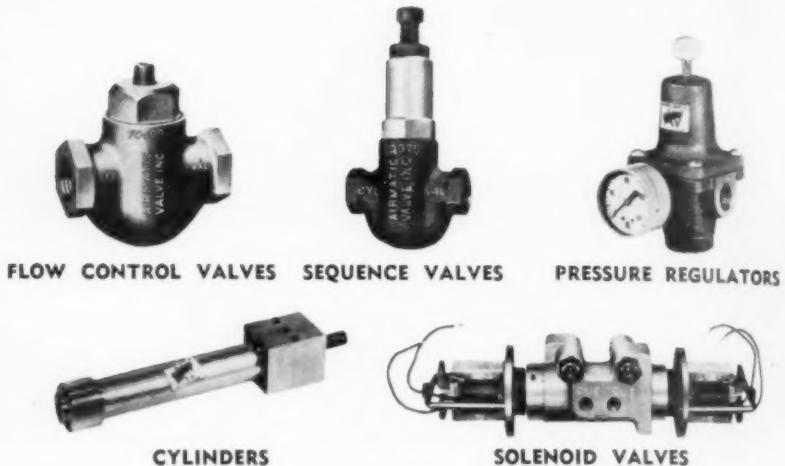


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MOTCH & MERRYWEATHER
MACHINERY CO.

Cutting Tool Manufacturing Division

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SPECIFY AIRMATIC**



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This Month's
GEAR PIX

7/10 MINUTE FOR 118 TEETH

Stacked, back to back, two 6" diameter blanks have 59 teeth on each formed in 0.70 minutes on this SHEAR-SPEED gear shaper, in a large gear plant. Loading time is held to a minimum with automatic hydraulic clamping.

TRUE RADIUS FILLETS—True .070" radius fillets (for maximum strength) at the base of each spur tooth are formed simultaneously on these 17-tooth gears. The 7/9 diametral pitch 1 1/4" face width countershaft gears are cut on two SHEAR-SPEED gear shapers manned by one operator on a truck gear production line.

↑ **12 SECONDS FOR FINISHING**—Floor to floor shaving time on these overdrive pinions is 12 seconds. Operator loads the chute through the size control fixture, the rest of the cycle is automatic. Average production is 40,000 pieces between cutter sharpenings. Stock removal is 0.003-0.005" over pins.

**MICHIGAN
TOOL COMPANY**

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This is the discharge end of the machine. The part, which is originally in vertical position, is laid horizontally and swung 90° to expose all sides to the tools.

SNYDER SPECIAL automatic
**24-station transfer machine for processing automotive
water pump housings; drills, mills, faces, chamfers, taps
all holes and probes tap drill holes. Production, 81 pieces
an hour at 80% efficiency.**



SNYDER

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30 Years of Successful Cooperation with Leading American Industries

His
"6th Sense"
is mostly
good
business sense



**...another good reason why it pays
to depend on your**

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It's his good business sense that helps your Morse-Franchised Distributor to anticipate your wants — and keeps him constantly on the alert for those products you might need.

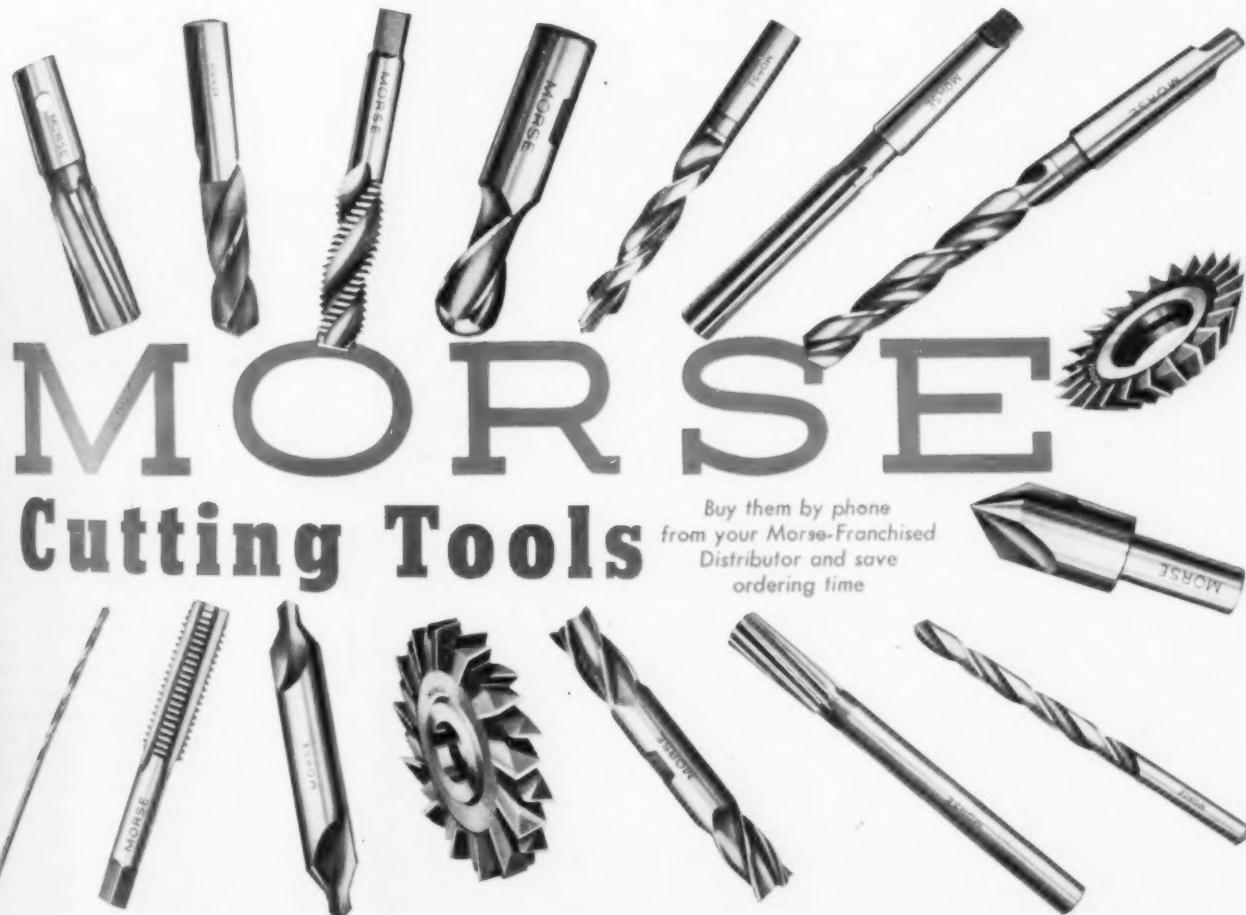
This foresightedness is an invaluable protection for you in your supply problems . . . just as the Morse Line is top

protection for your cutting-tool dollar. On any job, Morse can give you the most for your money . . . and your Morse-Franchised Distributor is always right on deck to see that you get it. So for drills, taps, dies, reamers, end mills and cutters . . . plain or Electrolized . . . *depend* on your Morse-Franchised Distributor.

MORSE TWIST DRILL & MACHINE COMPANY

(Division of VAN NORMAN COMPANY)

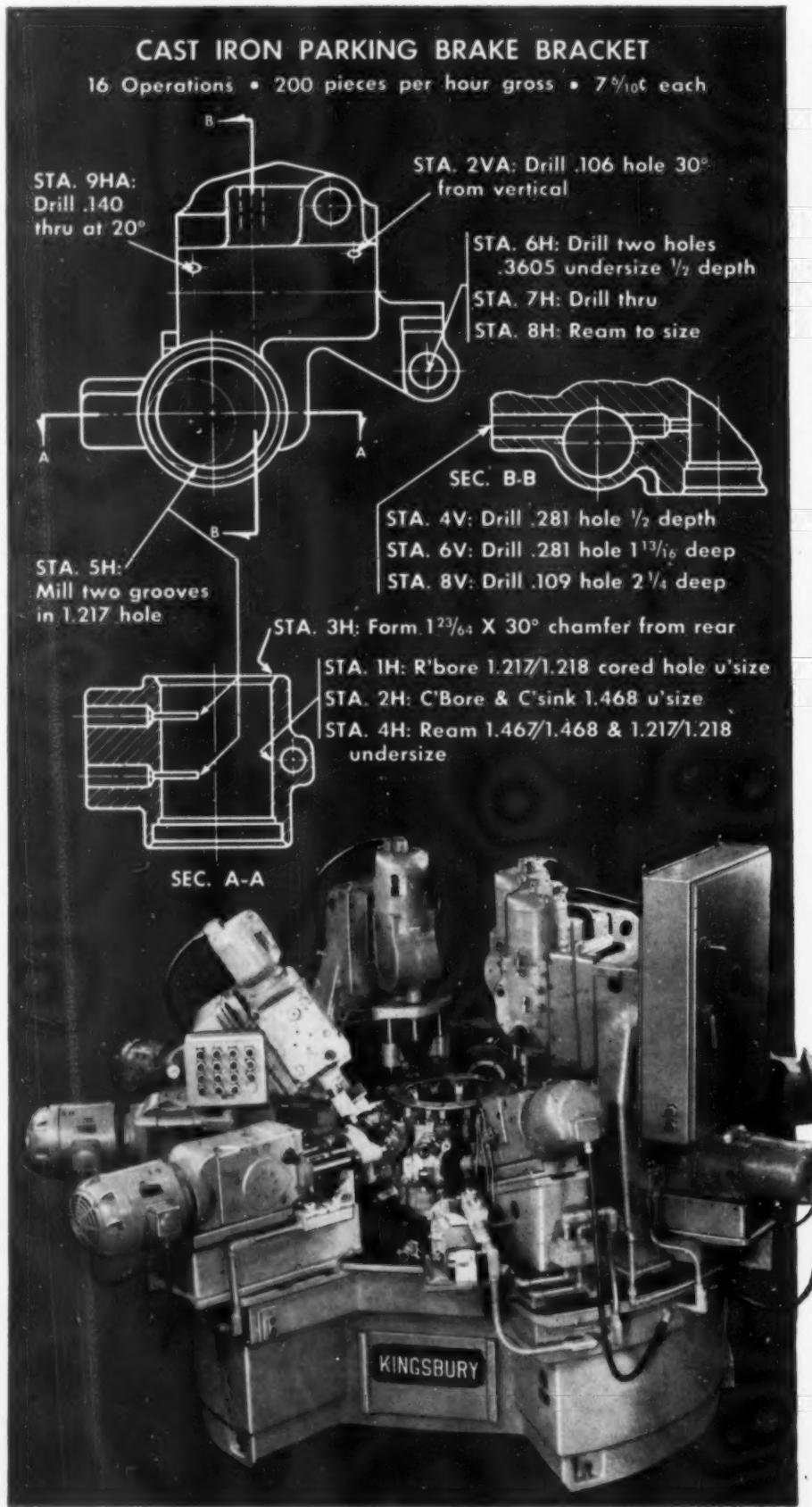
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Buy them by phone
from your Morse-Franchised
Distributor and save
ordering time

"Operations Kingsbury"

can mean greater production



This Kingsbury Machine has change-over features which enable the customer to go into production with any one of four different brake bracket bodies. Selector switch buttons for each Kingsbury head, and simple tool settings are all the adjustments needed.

Prints called for certain machining operations which also presented interesting problems. One of these, requiring twin slots or grooves within the arc of the cylinder, is illustrated and described below. Another employs a Kingsbury-designed recessing tool at Station 3 to form a 30° chamfer at the rear of the cylinder...

Altogether, there are 16 operations on the part shown here: eight drilling, three reaming, two boring, two milling and one chamfering — a total of 3,200 operations per hour gross for low-cost, high production — on any one of four models.

Carburetor bodies, also, must be interchangeable throughout. The one on the right is. In the



Section A-A at left shows the tool diameter and location of two grooves or slots milled in the arc of the cylinder wall and connecting with two ports. The operation is performed at Station 5. A horizontal unit with a special head advances the tool into the bore, feeds the twin-milling cutters with an oscillating motion and withdraws the tool — all within the machine time-cycle of 18 seconds.

and model changeover savings for you . . .

brief interval it spends in the Kingsbury machine, it is worked upon at 11 stations where 12 operations are performed. One of these involves an interesting bushing mechanism illustrated and described below.

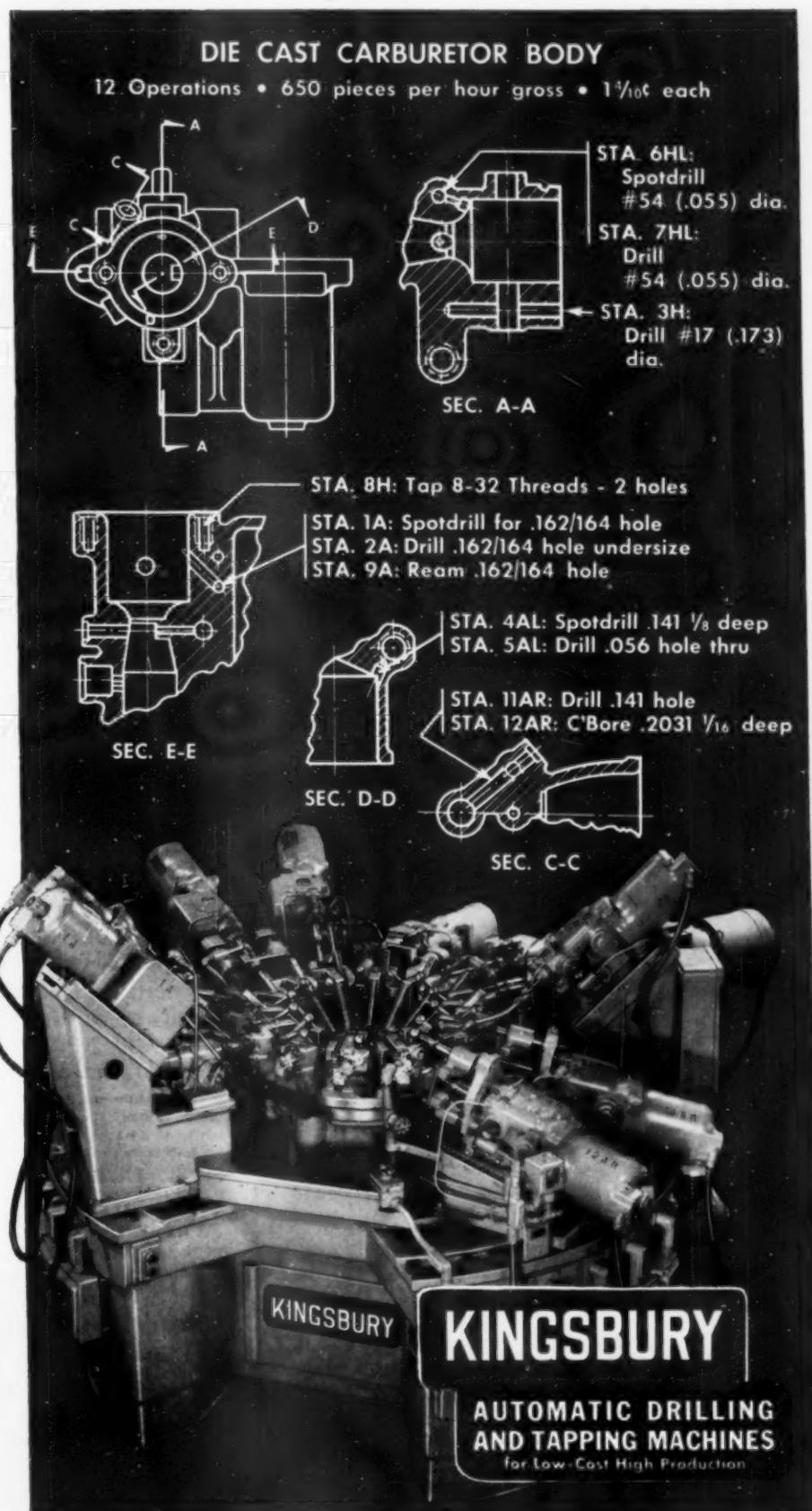


There's something quite *sure* about a Kingsbury. It's more than dependable heads, index mechanism, synchronized safety control system, cutting tool guide methods . . . a combination of all these, with work-holding fixtures specially designed and built for each part . . . by men who know how and like the challenge of this work. With more than 5,000 successful Kingsburys behind us you can feel quite sure that if we feel it's a Kingsbury job, a Kingsbury machine will do it well.

Kingsbury Machine Tool Corp.
109 Laurel Street, Keene, N. H.



Section E-E at right shows location of a hole reamed .162/.164 at an angle of 45° with the inner bore of a larger hole. The operation is performed at Station 1 where a cam-controlled horizontal plug-type bushing carrier places an angular tool guide bushing inside the bore for the $\frac{3}{16}$ spot drill. All this is accomplished in about four seconds!

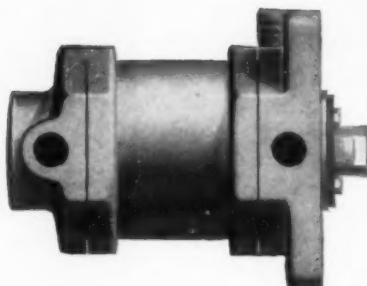


Why choose a Rivett Hydraulic Cylinder?

Quick Delivery?

YES!

If you're in a tight spot and need standard models, Rivett can ship in two days.



Low Price?

YES!

You'll make the best deal with Rivett. Large volume production makes prices competitive!

High Quality?

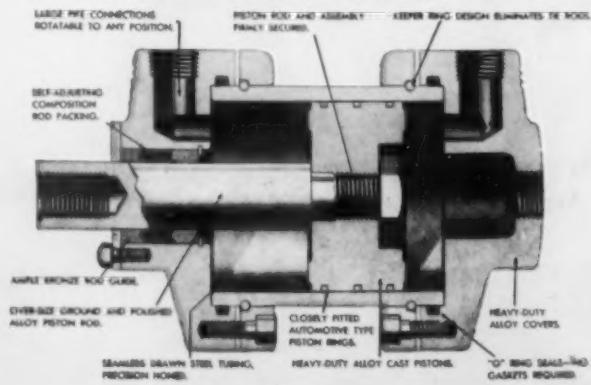
YES!

This is the most important reason for choosing Rivett! After a cylinder is installed, delivery and price are soon forgotten—but not the cylinder's productivity! It is then that a poor cylinder reveals its really high cost. For its faulty construction can result in operational failure—with a breakdown in production.

Better—far better, to buy the quality cylinder; gain the advantages of delivery and price; and enjoy uninterrupted production as well!



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THE BETTER YOU LIKE RIVETT!**



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power package

AIR AND HYDRAULIC — VALVES, CYLINDERS, POWER UNITS

The "editorialized message" was written after learning the results of an extensive survey recently made by another organization.

LAPointe

the name that is known
in BROACHING

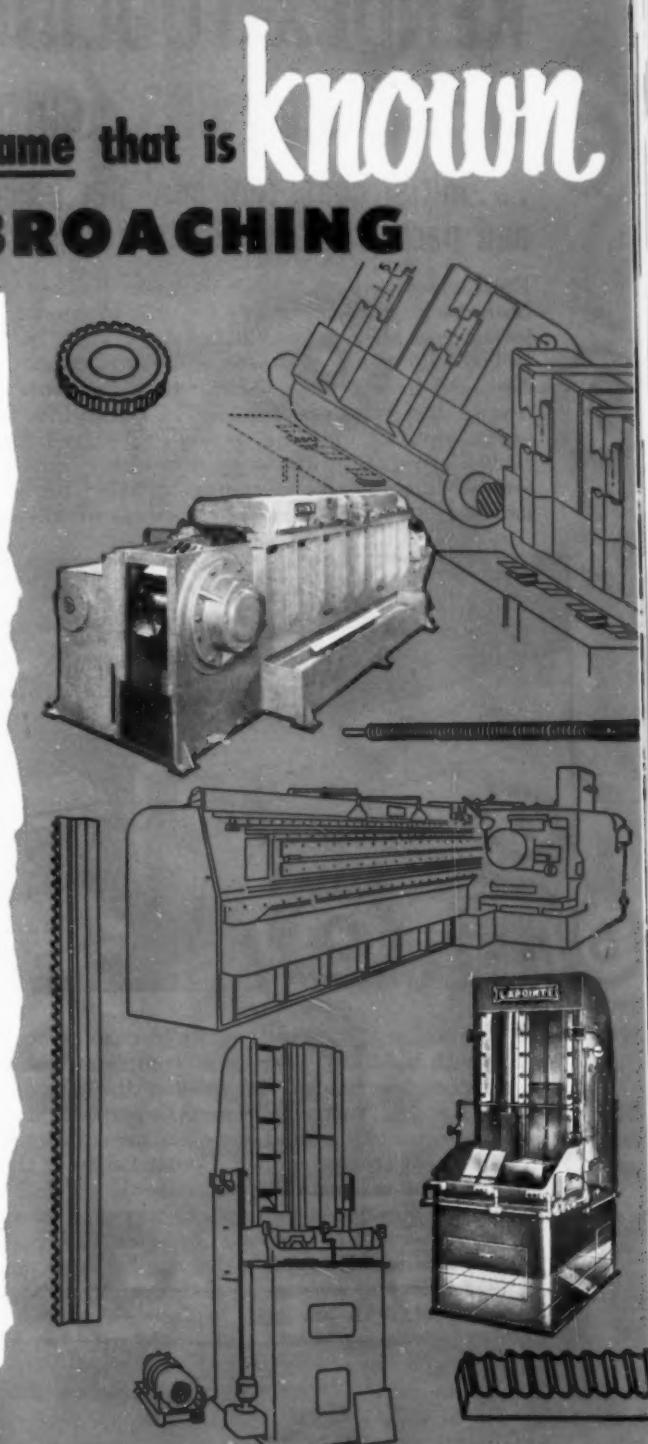
In any industry, there's always one manufacturer's name that stands out — that comes to mind first when you think about that industry. You know this is true. You can think of several, right now, without half trying.

In the field of broaching, men for a great many years have put Lapointe at the top of the list in this matter of name recognition. That may be caused partly by Lapointe's age, for Lapointe did indeed pioneer the development of broaching 53 years ago. Or it may be caused partly by Lapointe's size, for Lapointe several times has been forced to substantially increase its plant, this physical growth placing Lapointe always in the "number one" spot as the world's largest manufacturer of broaching machines and broaches.

But age and size alone do not necessarily constitute leadership, or assure that yours will be the name that is known. Here at Lapointe we like to think that it comes from the capable, loyal organization that has been built up through these many years of making broaching equipment exclusively. Our engineers and our plant personnel live in the atmosphere of broaching. And this activity embraces the entire broaching process — including not only the machines and tools but also the designing and building of the all-important fixtures that so often make the difference between success or failure in a particular broaching application.

It is this engineering experience, this ingrained and intuitive "broaching sensitivity", that keeps Lapointe at the top of the list.

We realize that no amount of advertising could accomplish that result. No, it's the quiet recognition and acceptance by important men in industry who *know broaching*, that makes Lapointe "the name that is known." We are grateful for this, and we intend to keep it that way.



LAPointe

MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.
In England: Watford, Hertfordshire



THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

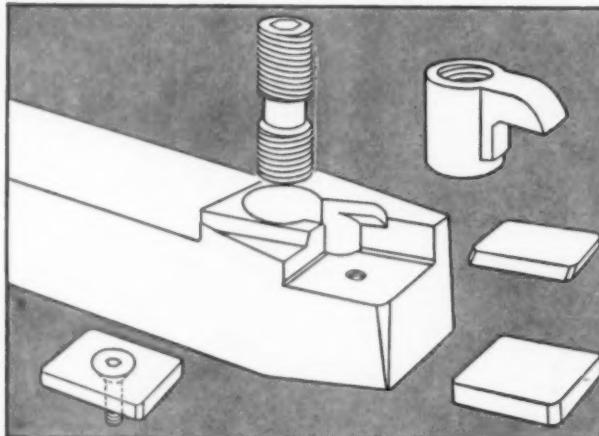
NEW KENDEX^{*} TOOLING

costs less on all 3 counts

... initial cost, tool cost per piece
and parts replacement cost

Each component of the new Kendex Tooling has been designed with but one thought in mind . . . lowest possible cost per cutting edge.

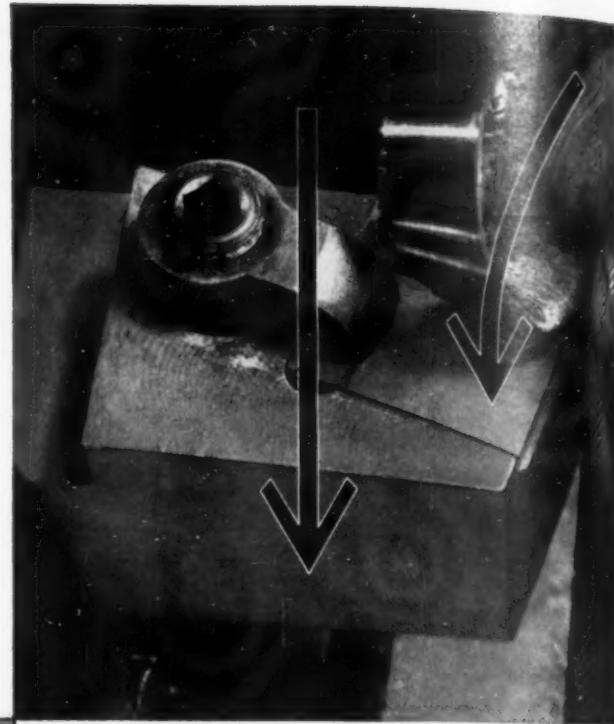
The holders are of simple but sturdy construction, and have the capacity to take deep cuts in a wide variety of operations. The clamp lifts for quick, accurate indexing, and is so designed that clamp forces are in the same direction as cutting forces—not opposed to them—to avoid counter stresses. Hardened, replaceable shims, on all but



the smallest size, protect shanks in case of accidents with the tools. There is no complicated seat adjustment mechanism to weaken the Kendex shank. Kendex "turnover" inserts fit perfectly into place in accurately ground seats, and are supported by solid, heat-treated shanks. Center height of the cutting point is constantly maintained.

The new Kendex is available in a range of sizes in nine styles and two models: (1) Standard Tool used with or without replaceable chipbreakers, for a wide variety of average operations; (2) Heavy Duty model, with low cost, replaceable chip deflector, for cutting heavy and irregularly shaped forgings or castings where depth of cut may vary as much as one inch from side to side. Both models use "throwaway" inserts . . . eliminate grinding.

To learn how you can cut machining costs on all three counts, call your Kennametal representative, or write to KENNAMETAL INC., Latrobe, Pa.



The effectiveness of the rugged Kendex holder can be measured by its capacity to take a variety of cuts, from extra light to very deep, using the same tool.

Clamp forces are in same direction as cutting forces—and not opposed to them. This is indicated by the arrows in the above photograph. Counter stresses are thus eliminated, adding to tool life.

← The new Kendex is simple in design with a minimum of parts . . . no complex mechanism to adjust or fail. "Throwaway" type inserts index quickly and accurately in the rugged, heat-treated shank, with cutting edge perfectly aligned. Clamp has sufficient travel to hold insert when carbide chip-breaker is not used. Shim (where used) screws to holder.

The table below gives a comparison of initial cost of Kendex holder and hardware with a comparative, competitive tool. Note the low cost of replacement parts for the Kendex KAR 16.

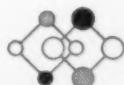
TOOL COST COMPARISON

(1" x 1" shank, without inserts)

Toolholder "A"	Kendex KAR 16
Holder only.....	\$25.00
Hardware:	Holder only..... \$ 8.00
Chipbreaker plate..... \$3.50	Hardware:
Elevator..... 4.25	Shim†..... \$0.90
Main screw..... 1.00	Clamp..... 1.25
Chipbreaker plate screws..... 0.35	Clamp Screw..... 0.15
	2.30
Total initial investment..... \$34.10	Total initial investment..... \$10.30

†Hardened, replaceable shim absorbs stresses of any possible overloading beyond tool capacity. Inserts last longer and machining costs are held to a minimum.

*Registered trademark



INDUSTRY AND
KENNAMETAL
...Partners in Progress



Machines too,
develop through

EVOLUTION



LEES-BRADNER

Proudly announces the latest
developments in the model 7 type HD
high speed production hobbing machine

Just as given species improve, giving way to the constant press of nature, so do machines change and improve with the ever-increasing demands of industry.

The Lees-Bradner 7 HD Single Spindle Hobber is a good example. It has moved forward in engineering and design improvements to meet today's and tomorrow's production demands.

Pioneers in high speed hobbing, The Lees-Bradner Company has, through constant experimentation, created a hobbing machine far superior to its prototype. The new Model 7 Type HD Single Spindle Hobbing Machine offers industry a heavier and faster machine. Weighing approximately 1,000 lbs. more than its predecessor, it has a heavier headstock, heavier column, 10 H. P. motor and 2 H. P. rapid traverse motor.

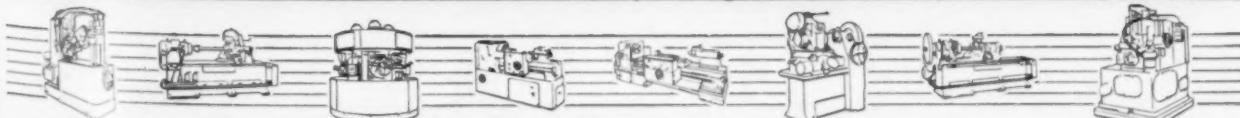
Designed-in improvements such as these give industry savings in time and labor while meeting today's production demands . . . plus the extra capacity for tomorrow's requirements.

Demonstrations may be arranged on request. Contact your Lees-Bradner representative, or write us direct. No obligation, of course.

the LEES-BRADNER

CLEVELAND 11, OHIO, U.S.A.

Company



MODEL R HOBBER HT THREAD MILLER 7-A ROTARY HOBBERS CRI-DAN THREADING MACHINES MODEL 40 THREAD MILLER SH SPLINE HOBBER 12-S HOBBER

IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER

accurate **CINCINNATI**

shearing from

20

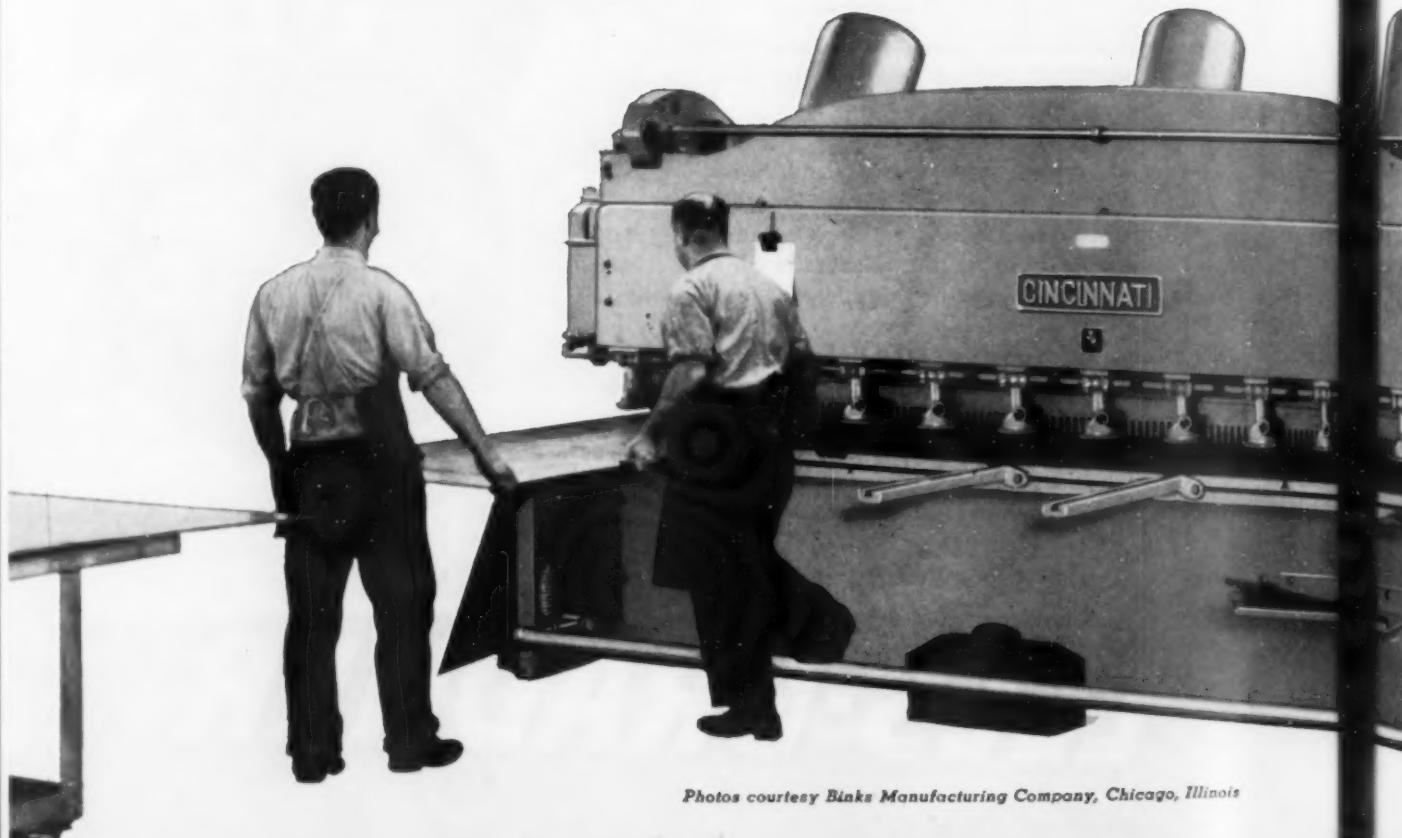
**GAUGE
SHEETS**

to 5/16"

PLATE

**...with ONE
knife setting**

... SPEEDS PRODUCTION



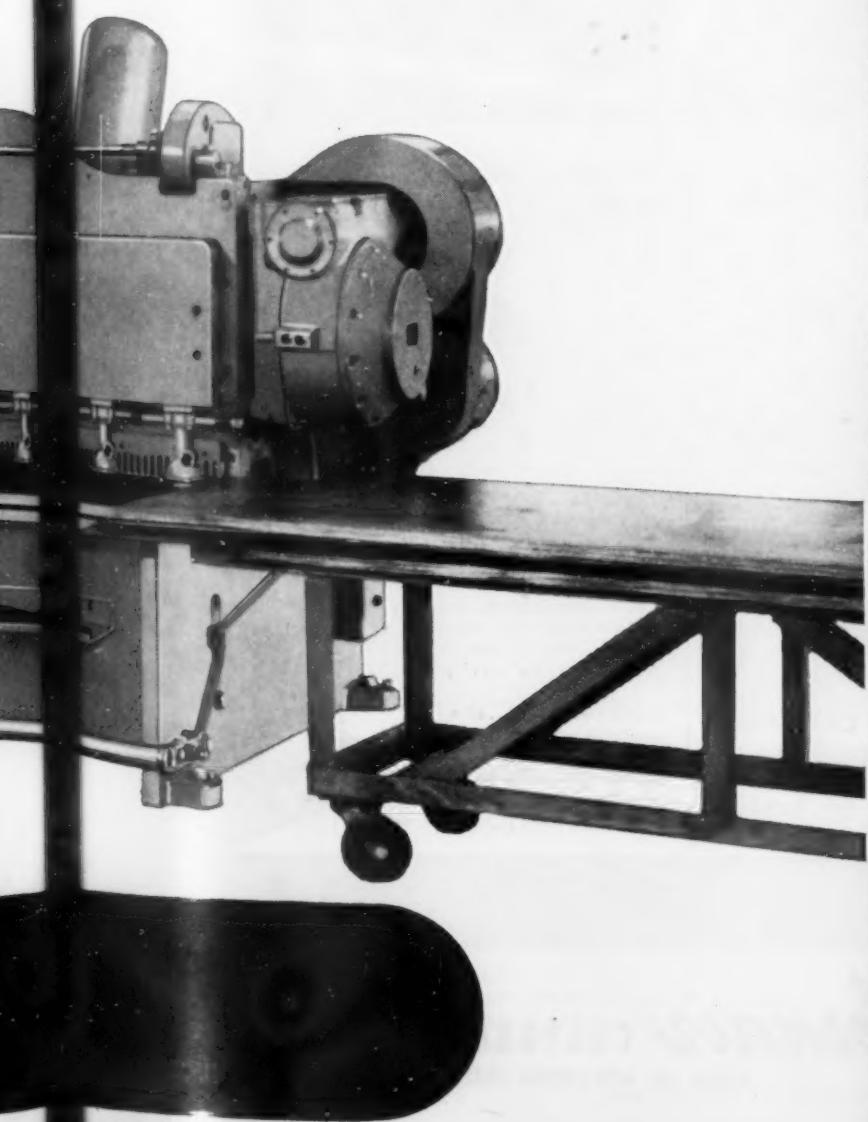
Photos courtesy Binks Manufacturing Company, Chicago, Illinois



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

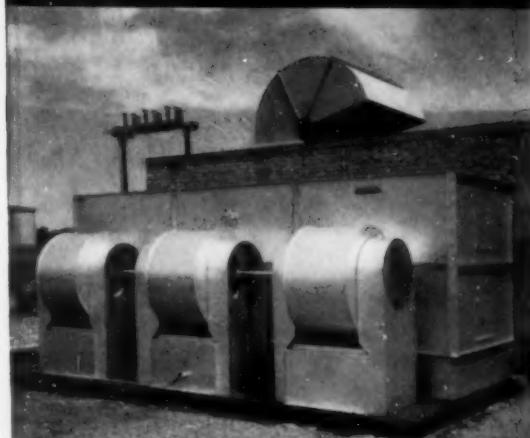
SHAPERS • SHEARS • BRAKES



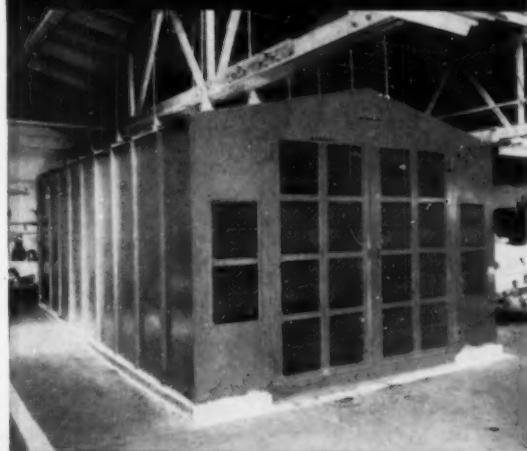
Here 20 gauge to $\frac{1}{16}$ " plate is sheared with no change of knife clearance—a time saving and production increasing feature.

The Binks Manufacturing Company say this Cincinnati Shear is a very accurate machine and a most profitable investment.

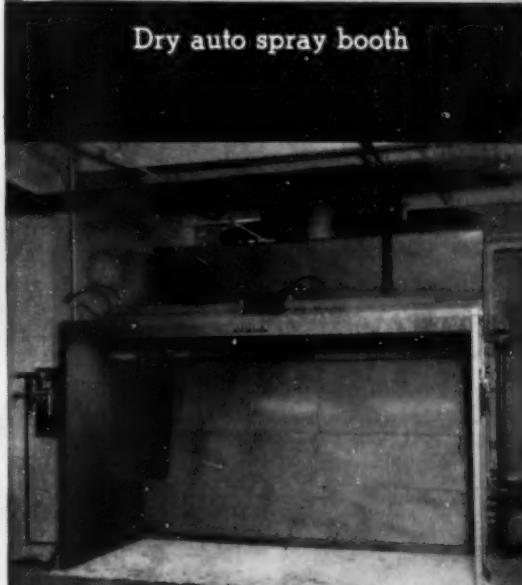
Write for Catalog S-6.



Water cooling tower



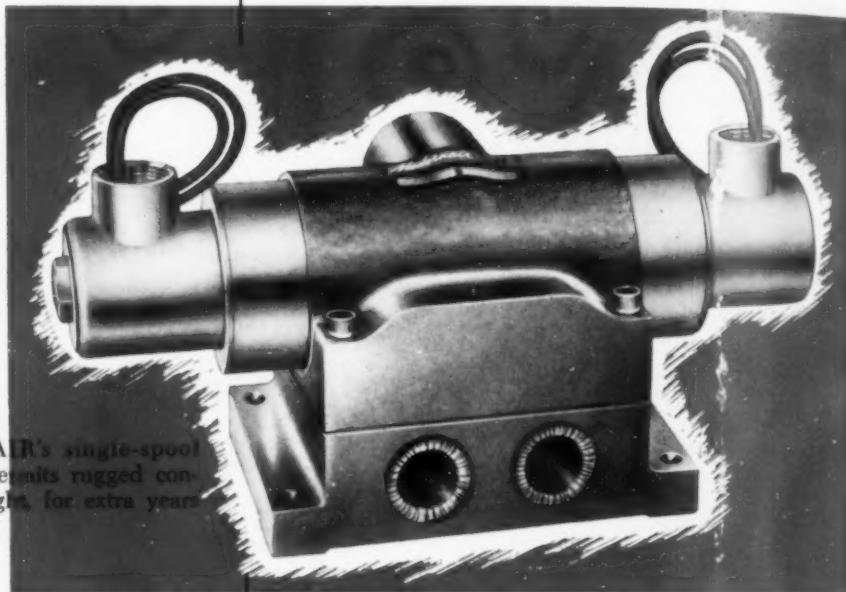
Dry auto spray booth



Water wash spray booth

**Now - get these 5
money-saving benefits**

with *Moderna*r**
MV Series Valves



Longer Service Life... MODERNAIR's single-spool design means fewer moving parts, permits rugged construction without excess bulk or weight, for extra years of reliable service.

Easier Maintenance... all seals are commercially available "O" rings, moving seals mounted on easily-removable sliding spool; can be replaced in a few moments with little disassembly.

Corrosion Resistant Construction... aluminum alloy body with hard drawn brass porting sleeve, aluminum alloy spool with oil-resistant synthetic rubber "O" rings.

Compactness... exclusive MODERNAIR design reduces bulk and weight, gives you maximum performance in minimum size (see photos for typical dimensions).

Versatility... available in $\frac{1}{4}$ " through 1" port sizes for air or oil hydraulic service to 200 p.s.i., in all popular mounting styles and operating types. Basic parts completely interchangeable—reduces inventory to a minimum!

NOW READY... NEW, MODERNAIR CATALOG
Gives complete dimension data, prices on MODERNAIR's full line of cylinders, valves, packaged fluid power devices. Write today for your free copy of this handy reference book.

SOLENOID OPERATED... single or double solenoid, in sub-plate (shown), or gasket mountings. $\frac{1}{4}$ " port size is only 9 $\frac{1}{4}$ " long overall; 1" port size, 13 $\frac{1}{4}$ " long.



PILOT OPERATED... in full pilot operated or spring return types, for gasket (shown), sub-plate or standard threaded-pipe mountings. Button bleeders may be mounted in end caps if desired. Only 5" long in $\frac{1}{2}$ " port size, 8 $\frac{1}{4}$ " in 1" ports.

LEVER OPERATED... also available with foot pedal or treadle, or roller cam. Standard threaded pipe mounting shown, others available.



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*Moderna*r** CORPORATION
Trademark

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*Extending the Range
of Modern Surface Grinding*



New Precision Surface Grinders
Combine Versatility with Mechanical Reliability

Straight surface grinding . . . plunge grinding . . . cylindrical grinding . . . angular grinding . . . inside grinding . . . these are a few of the jobs you can do with a DoALL. Fully automatic remote control available for production line work . . . basic rigidity and accuracy that permits complete reliance upon handwheel settings . . . dozens of features to give you a greater return from your surface grinder investment . . .

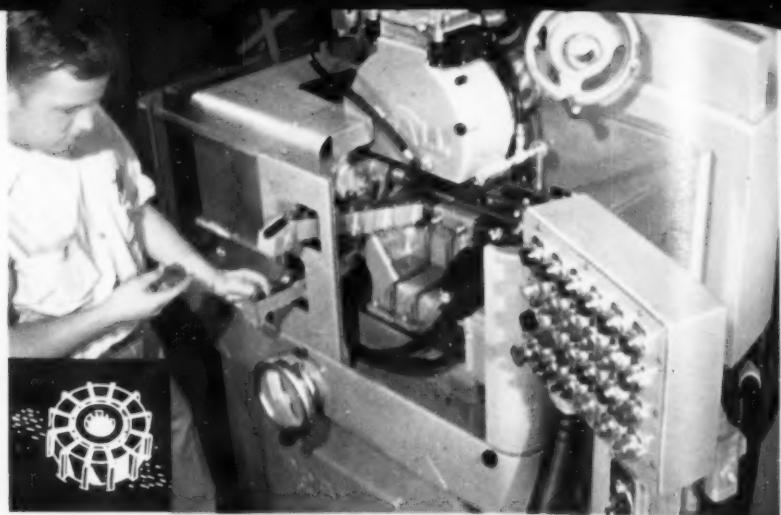
DoALL

The DoALL Company
Des Plaines, ILL., U.S.A.

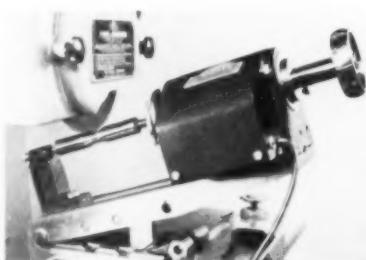
turn the page for more details.



AUTOMATION GRINDING—special DoALL Grinder for precision finishes on deflection yoke segments for color television tubes.



SPECIAL FULLY AUTOMATIC GRINDER for grinding slots in power steering pump rotors. Parts indexed, ground and ejected.



CYLINDRICAL GRINDING



ANGULAR GRINDING



"COOL GRINDING"® (coolant through the wheel) reduces heat, prevents checks and cracks, permits higher speeds, heavier feeds. Note fine mist from wheel on blotter. U.S. Pat. No. 2470350



You Get More Return On Your Investment When You Specify DoALL Surface Grinders

New DoALL Precision Surface Grinders are designed to reduce production line and toolroom costs through new performance standards:

1. Precision that permits complete reliance upon handwheel settings, eliminates frequent checking, increases output and reduces errors.

2. Versatility that provides straight surface grinding, grooving, slotting, notching, internal grinding, crush form grinding, cylindrical grinding and other operations with the same machine.

3. Power and rigidity plus "Cool Grinding" to produce heavier cuts and faster operation without sacrifice of accuracy, finish and wheel life.

4. A complete line of accessories to best meet the requirements of any toolroom or production operation.

5. Modification of basic grinders is available for any special applications.

★ Combination hydraulic and manual table and crossfeed traverse standard on all models.

★ Optional, all models:

- Fully automatic operation (table, crossfeed, downfeed)
- Combination flood cooling and "Cool Grinding" (coolant flows through wheel.)
- Flood coolant system
- Variable speed spindle drive
- Universal high-speed spindle
- Cylindrical grinding and indexing attachment
- Crush form grinding equipment plus many others.

See these new models before you buy—through an actual demonstration at your plant you will see what these machines can do on your grinding operations. There is no obligation. Call your local DoALL Store—see classified listing in your phone book—or write THE DoALL COMPANY.

NEW MODELS

7 new models from 6" x 18" to 10" x 30". 4 chuck sizes. 5 wheel sizes—7", 8", 10", 12", 14". Work height capacity is 12½".

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Films—two color sound movies for group showings: "Techniques of Surface Grinding" and "Extending the Range of Modern Surface Grinding".



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The DoALL Company, Des Plaines, Ill.

EDUCATIONAL STUDY
WALL CHARTS
Economics Principles
\$1.00 each postpaid
Low quantity price



STANDARD TOOL

serving industry since 1881



Announces A NEW LINE OF Carbide-Tipped Tools

- To broaden its service to you, Standard Tool now offers carbide-tipped tools in addition to its regular line of industrial cutting tools.

Your Standard Tool Man, Serving Industry Since 1881, will show you many applications where carbide-tipped tools will help you get faster cutting, longer tool life.

STANDARD TOOL Co.

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THE STANDARD LINE: Twist Drills • Reamers • Taps • Dies • Milling Cutters • End Mills • Hobs • Counterbores • Special and Carbide-Tipped Tools



Drill 2 Holes for Heat Control Butter-fly in Manifold, Ream 2 Holes,
Drill Stop Pin Hole, Hopper Feed 2 Bushings, Press into Place, Stake Bushings,
Ream 2 Bushings, Hopper Feed Pin and Press into Place.

THIS MACHINE PRODUCES

120 Manifolds per Hour with Bushings and Pin in Place. The Units are Hydraulic with automatically lubricated, Hardened and Ground Ways with Vickers Controls on the Hydraulic Pump and Control Panel.

For Faster, More Economical Production

We also invite your inquiries as to our line of tapping units, and index tables, both manual and automatic.

DRILL HEAD CO. Detroit 34, Michigan

engineers and manufacturers of production machines and drill equipment

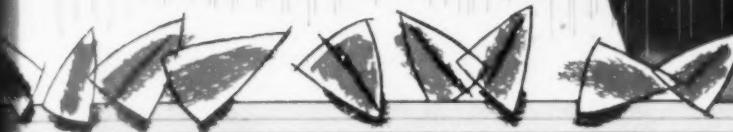


at the ASTE industrial exposition

Los Angeles, March 14-18

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TOOL STEELS**



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where qualified Company representatives
will be on hand
to discuss with you these
two newest Latrobe developments
XL—"self-lubricated"
high speed steels
FM—"free-machining"
high production die steels.

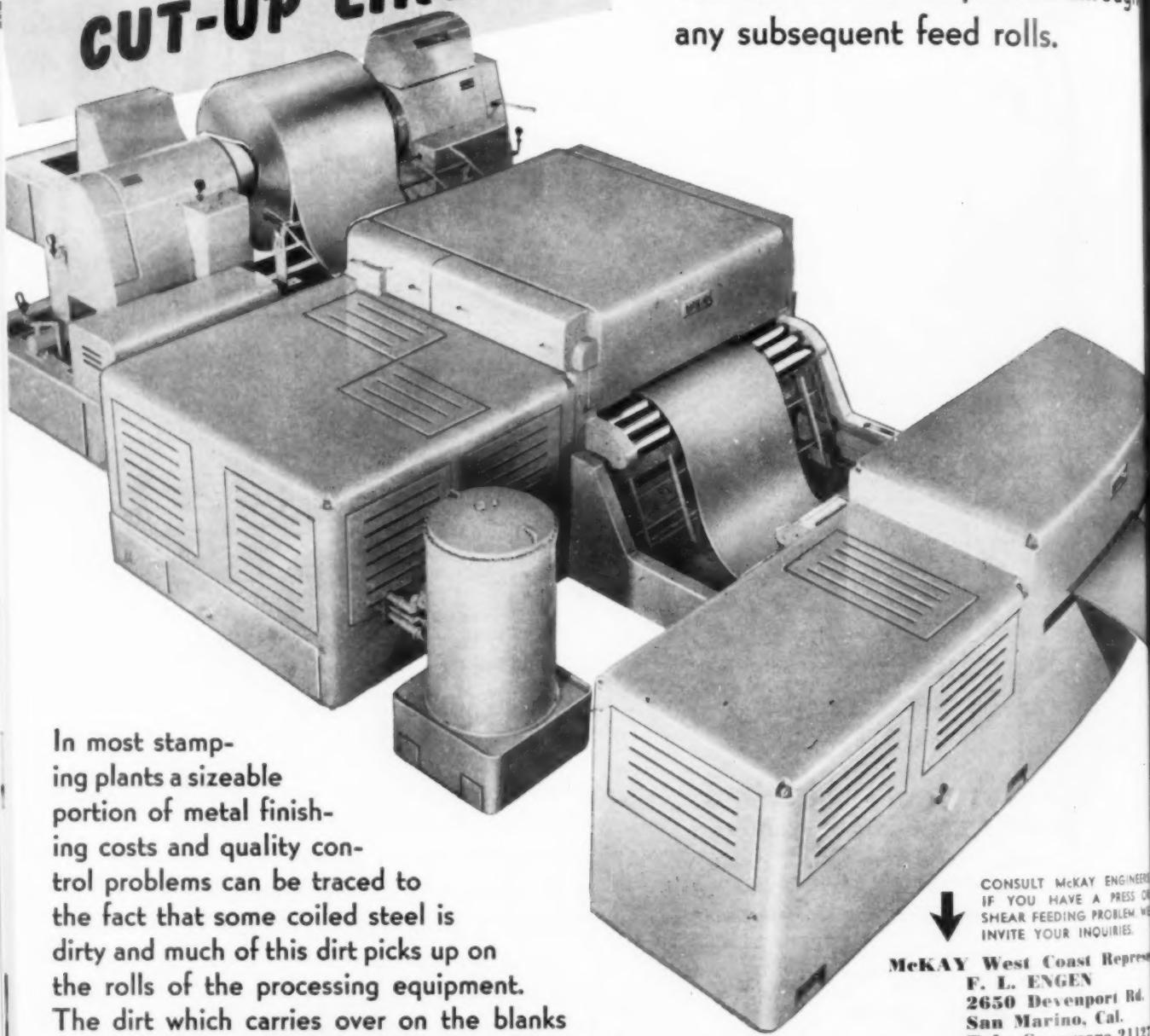
LATROBE STEEL COMPANY
LATROBE, PA.

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MCKAY

PRESS FEED
AND
CUT-UP LINES



In most stamping plants a sizeable portion of metal finishing costs and quality control problems can be traced to the fact that some coiled steel is dirty and much of this dirt picks up on the rolls of the processing equipment. The dirt which carries over on the blanks may cause scratches in the drawn panels during the forming operations. In several recent installations McKay has furnished a strip washing machine which utilizes

WASH THAT DIRT STRIP BEFORE SHEARING and BLANKING

The latest development in McKay coil feed lines is this new strip washing machine which thoroughly cleans the strip after it leaves the coil and before it passes through any subsequent feed rolls.

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IF YOU HAVE A PRESS OR
SHEAR FEEDING PROBLEM. WE
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high speed brushes and large volume solvent sprays to thoroughly clean the steel strip at high production speed.

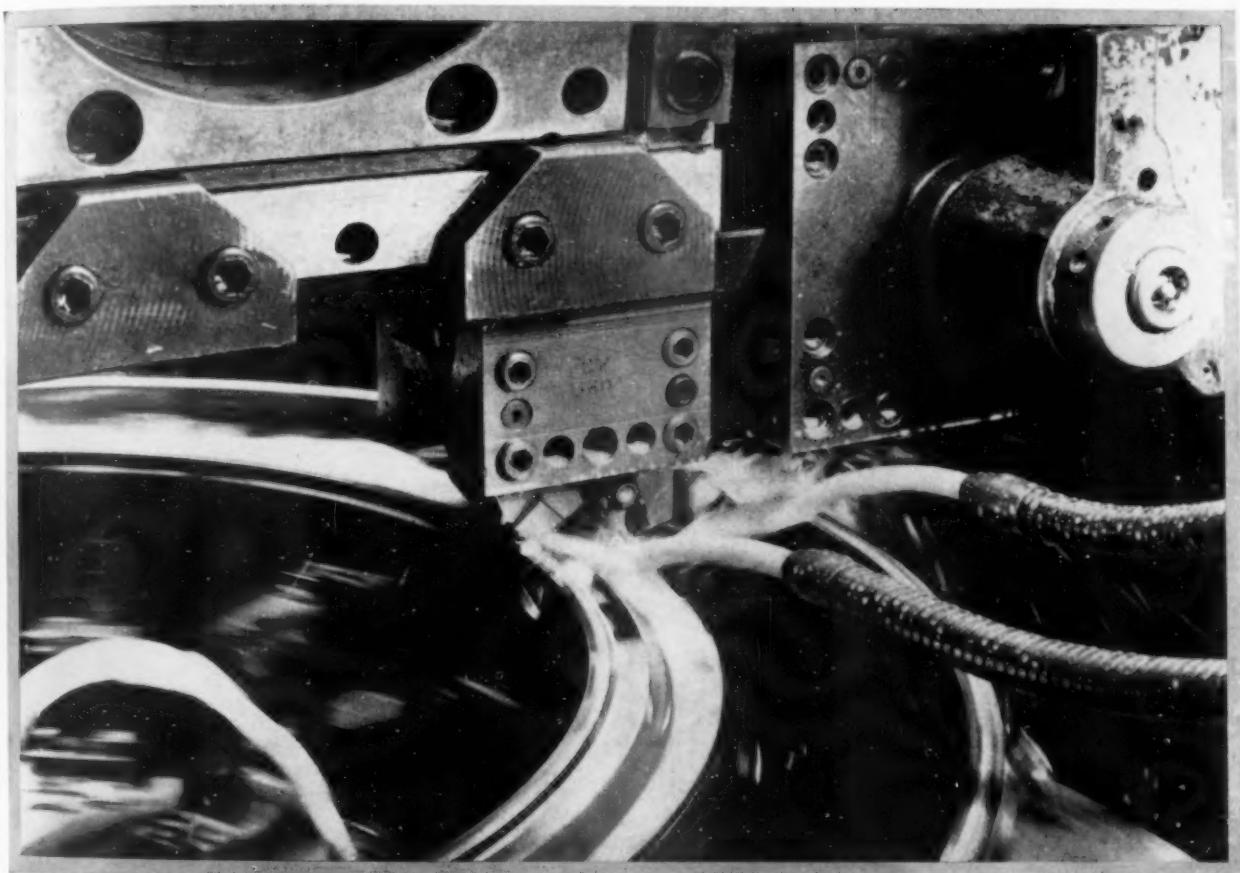
the MCKAY MACHINE Company
YOUNGSTOWN, OHIO



ENGINEERS AND DESIGNERS OF
EQUIPMENT FOR THE AUTOMOTIVE
FABRICATING AND STEEL INDUSTRY

Industry-wide records
prove that...as compared with other
steel-cutting carbides...

Carboloy® Grades 350, 370 carbides increase production as much as $3\frac{2}{3}$ times



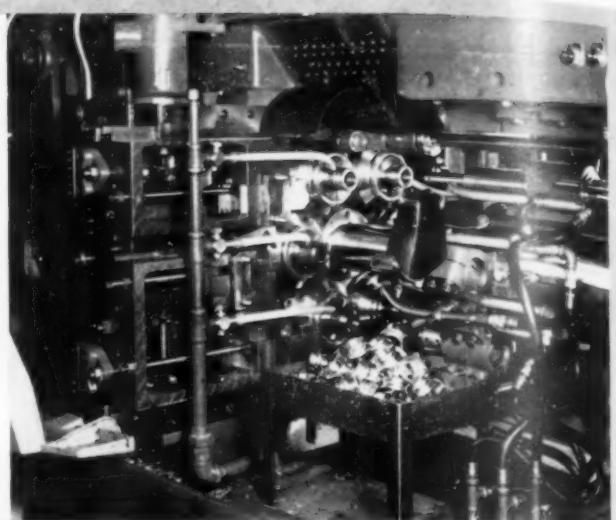
BEFORE CARBOLOY GRADE 370, 17 other carbides were tried by the Jet Division, Thompson Products, Inc., for facing 310 stainless-steel jet-engine compressor frames. The best any carbide could do was 3 pieces per 8-hour shift. With Grade 370, production jumped to 14 pieces. Tool life was doubled; tool inventory was lowered. Downtime losses were cut because Grade 370 inserts machined almost 3 times as many pieces per grind.

SETUP: Material—310 Stainless steel. Speed—340 SFPM. Feed—0.008 inch. Depth of cut—0.100 inch at 36 rpm. Coolant—Yes.

For other reports of new production and efficiency records set with Series 300 carbides, see the following pages.

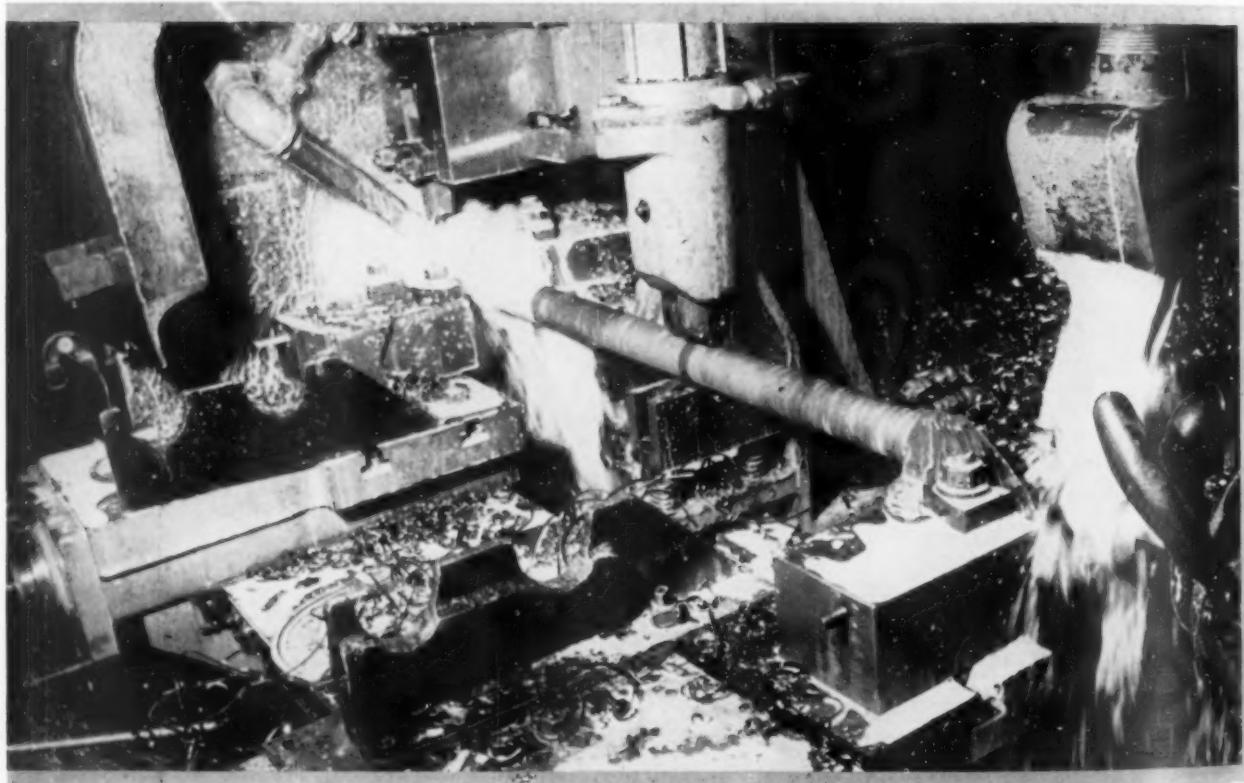
PRODUCTION TIME WAS CUT IN HALF when Grade 370-equipped tools were installed in this Cone 6-spindle bar automatic. Seven Grade 370 tools did the job of fourteen high-speed steel tools for machining inner bearing races.

SETUP: Material—SAE 52100 steel tubing. Speed—333 SFPM. Coolant—Yes.



Case-history proof of how . . .

New Carboloy Steel-cutting

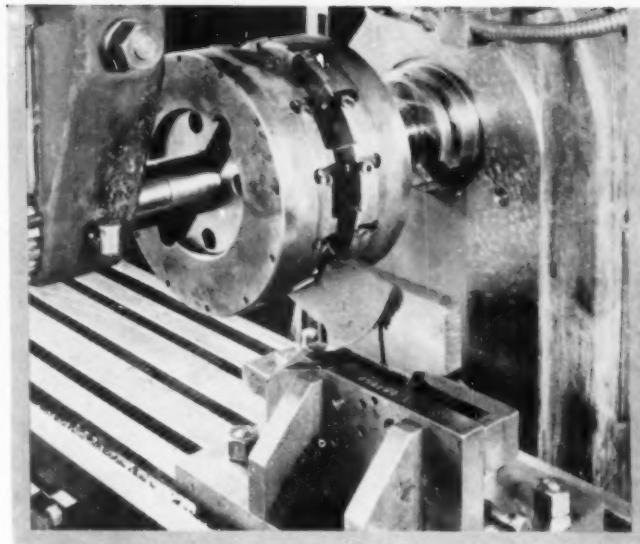


PRODUCTION WAS INCREASED more than 33% when Carboloy Grade 350 tools were used to turn this AISI 4150 48" truck axle forging. Grade 350 machines front and back ends simultaneously; eliminates chipping and flaking encountered with other carbides.

SETUP: Material—AISI 4150 steel forging. Speeds—200 SFPM on 2-inch dia.; 400 SFPM on 4-inch dia. Feeds—0.014 inch. Depth of cut— $\frac{1}{16}$ to $\frac{1}{8}$ inch. Coolant—Yes.

SWITCHING TO GRADE 370 inserts, for straddle milling this forging, enabled Robert H. Brooks Co. to go from almost no production to completely satisfactory production. Grade 370 held tolerances to the required thousandths on this jet fighter wing fitting; produced so fine a finish that it is impossible to determine the blend line after plating.

SETUP: Material—SAE 4140 forging, heat-treated between 40 to 43 Rockwell C. Speed—650 SFPM. Feed—0.0025 inch per tooth. Depths—0.062 inch and 0.083 inch. Coolant—Yes.



Grades outcut, outlast all other carbides

Here's why Series 300 carbides will immediately bring you increased production and greater operating efficiency:

1. Grades 350 and 370 have been designed for you to get the most out of your machine tools. They can operate without tip deformation at higher speeds and faster feeds than other carbides. This built-in production ability lets you take full advantage of your equipment.
2. Grades 350 and 370, proved by in-plant records, give more production per grind, more grinds per tool, more production per shift. In short, in hundreds of operations similar to those on these pages, they have outperformed other carbides in every respect.

Carboloy Series 300 carbides are made by a new carefully controlled process. This process gives Series 300 a built-in structural rigidity, which enables them to operate at temperatures as high as 1800° F... temperatures that cause cutting-edge deformation in other carbides.

You can get Carboloy cutting tools, boring tools, inserts and blanks of Grades 350 and 370 in a wide range of styles and sizes. Your Authorized Carboloy Distributor can fill your orders immediately. For the new Series 300 price list GT-305, send coupon on the next page, today.

Carboloy Created-Metals for Industrial Progress

Your Authorized Carboloy Distributor
can meet your steel-cutting needs from his...

New, enlarged line of Series 300 tools and blanks

With the addition of 117 new sizes of standard tools and blanks, your local Authorized Carboloy Distributor can now give you immediate delivery on practically every Grade 350 and 370 tool and blank you need. Many other sizes and styles are available nonstock from the Carboloy plant in Detroit.

Carbides for cutting all materials

In addition to the Series 300 carbides, complete stocks of Carboloy tools and blanks are available in various grades, for machining all materials—ferrous or nonferrous, metallic or nonmetallic.

The following standard-grade items have also been recently added to the standard line:

- 20 sizes of Grades 883 and 44A style 0000 blanks for heavy-duty cast-iron and nonferrous cutting.
- Throwaway-type blanks.
- Grade 883 style F and G offset turning tools in $\frac{1}{2}$ and $\frac{5}{8}$ inch sizes.
- Offset threading tools.

For price lists and specifications on Series 300 carbides and standard grades, send coupon today.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

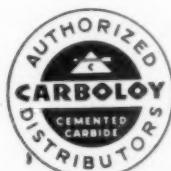


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CARBOLY
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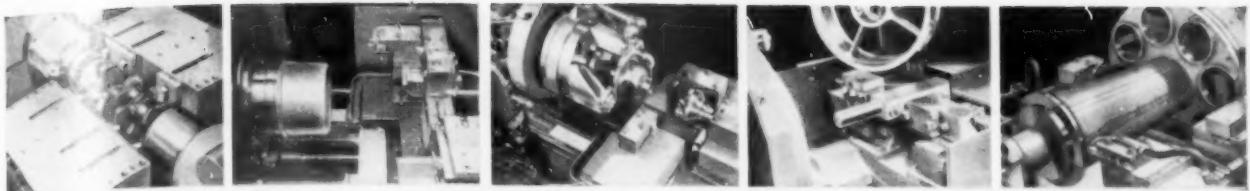
- Send Brief-a-Log GT-305, containing price list and specifications on Grades 350 and 370.
 Send Brief-a-Log GT-285, containing price list and specifications on standard grades.

Name _____ Title _____
Company _____
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See the Yellow Pages

... for the name of your local Authorized Carboloy Distributor. You'll find his name under the Carboloy trademark listing in classifications: TOOLS or TOOLMAKERS.



All these different tooling setups



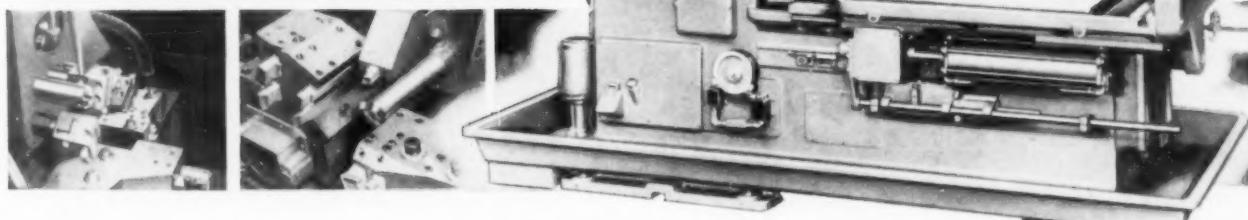
show the amazing versatility



of this fully automatic lathe



...the SIMPLIMATIC



Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these—jobs that would otherwise be put on special machines—built at extra-special cost. But this (and don't miss the important point!) is a *standard machine—at a standard price.*

If you have medium or long runs on parts up to $33\frac{1}{2}$ " in diameter, get the facts about the Simplimatic Automatic Lathe.

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THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

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FOR CLEANER CUTTING AND LONGER WHEEL LIFE

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Look for a wheel specially engineered and bonded to give you maximum cutting efficiency for your particular cut-off operations.

Safe, fast, clean metal cutting for sustained periods with a wheel that cuts freely, means savings in both time and money. You should look for a wheel that permits you to cut at high speed without burning, one that will leave no burr or discoloration and will last longer.

To give you these advantages, the wheel you buy should be custom-bonded for your specific cut-off job . . . to assure smooth, free-cutting action whether you work with hardened or soft steel, light gauge tubing, critical alloys, etc.

Specify the wheel designed specifically for improved cutting on

*your job . . . specify
Manhattan Cut-Off
Wheels.*



MANHATTAN CUT-OFF WHEELS

Manhattan developments in both rubber and resinoid bonds have greatly increased the cutting efficiency and long life of Manhattan Cut-Off Wheels. In factories where records are kept of the number of cuts per wheel, Manhattan wheels have proved they do a better job, longer . . . permit faster, cleaner cutting on all types of metals. Manhattan

Cut-Off Wheels are manufactured in the widest range of types and sizes. Manhattan sales engineers will aid you in specifying the exact one for your operations and show you how you can save time and money—get "More Use per Dollar"—at your plant with Manhattan Cut-Off Wheels and other types of high speed, heavy duty wheels.

RM 527

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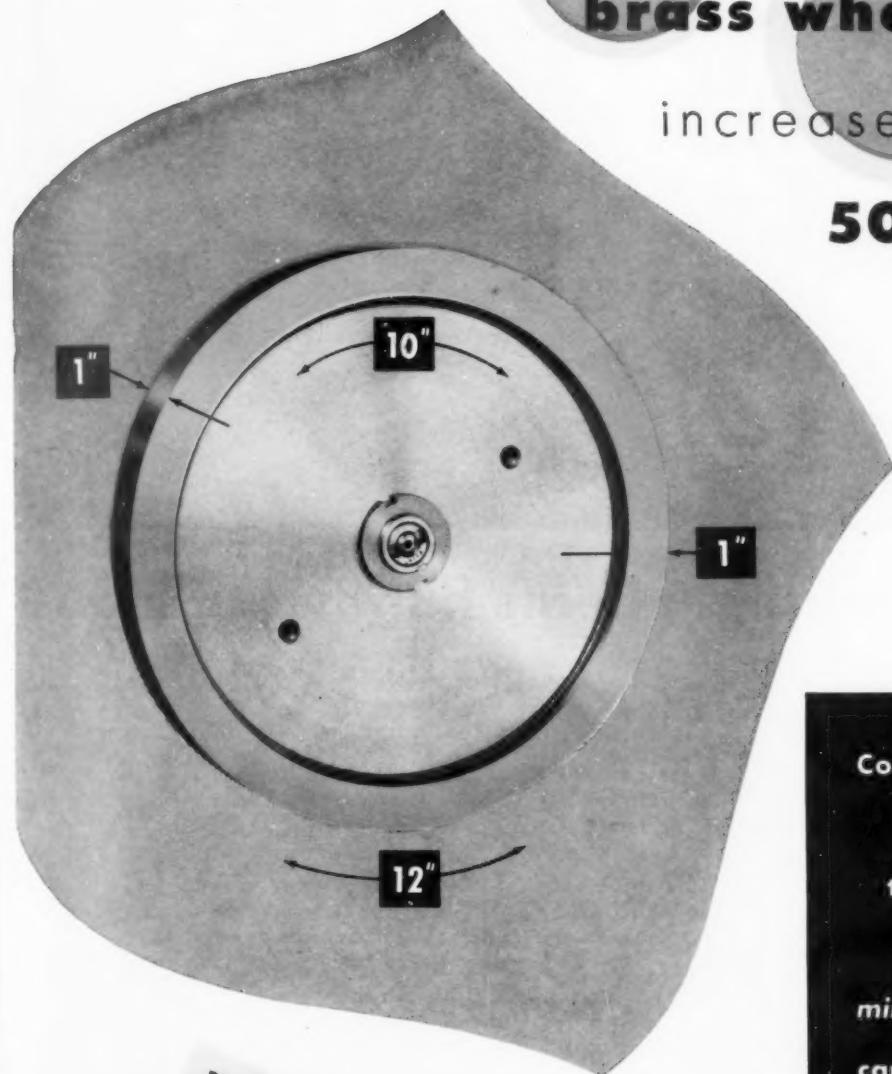
$\frac{1}{2} \times \frac{1}{2}$ tungsten carbide

insert tools with this \$45

brass wheel and

increase tool life

50 to 200%



Ave. cost per tool sharpened:

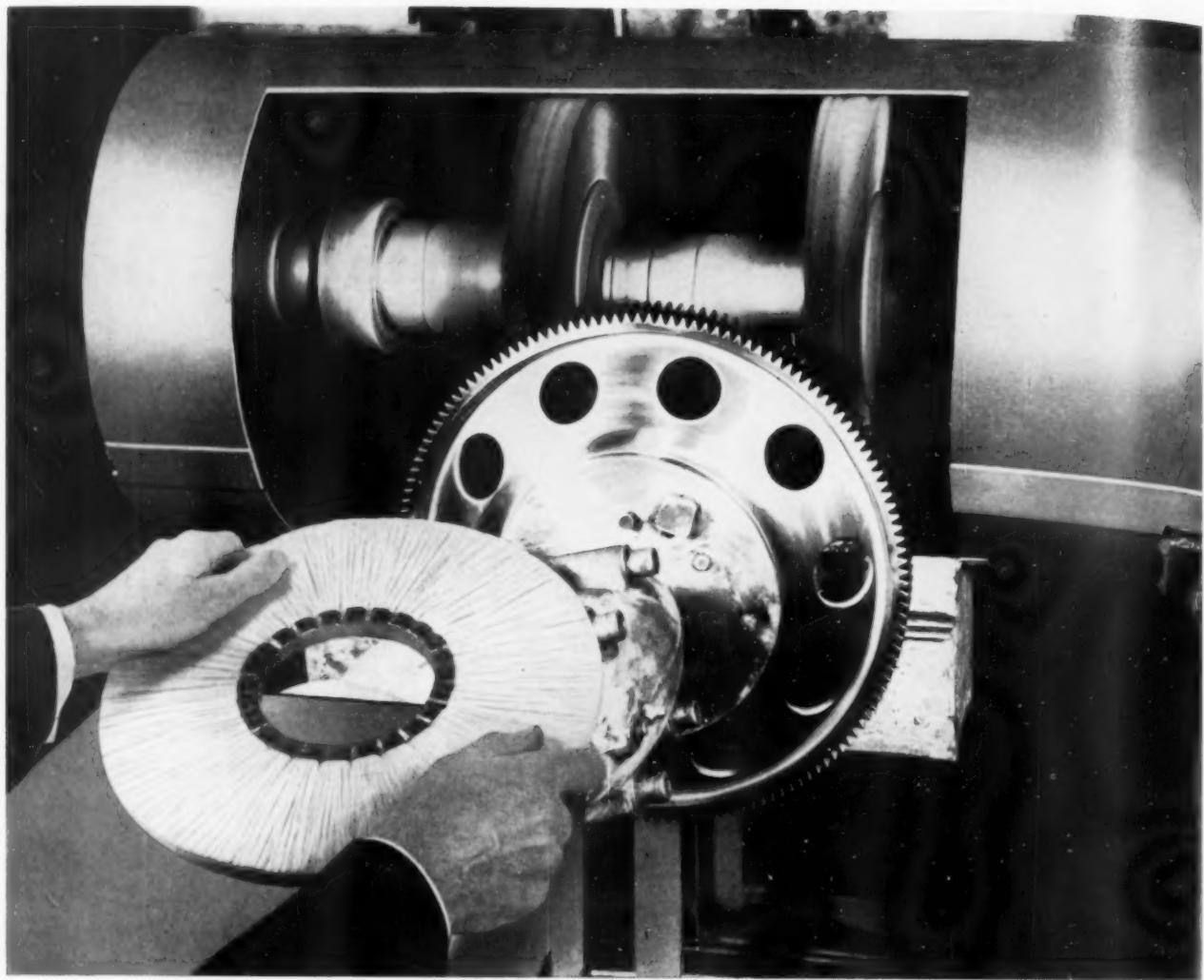
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wheel and save 50
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PRODUCTION EFFICIENCY IS HIGHER. Now it's easier to produce uniform finishes on many types of gears. Setup is simple . . . operations are done on preset time cycles to cut manufacturing costs.

What manual operations could an OBA eliminate for you?

7½ times as fast. Here, Osborn Fuscute® Brushes are removing burrs and blending surface junctures on spur gears. Each gear has two internal and two external gear sides that must be finished. Rate . . . 15 gears or 60 gear sides per hour. Former rate with manual method was at best two gears an hour.

Scrap has been virtually eliminated by Osborn's Power Brushing method. That's because surface quality of gears is more uniform. Stress concentrations have been eliminated by the surface juncture blending of gear teeth.

An Osborn Brushing Analysis can show you how to improve your operations through power brushing and benefit with savings like these on your cleaning, finishing and burr removal jobs. Call or write *The Osborn Manufacturing Company, Dept. K-13, 5401 Hamilton Ave., Cleveland 14, Ohio.*

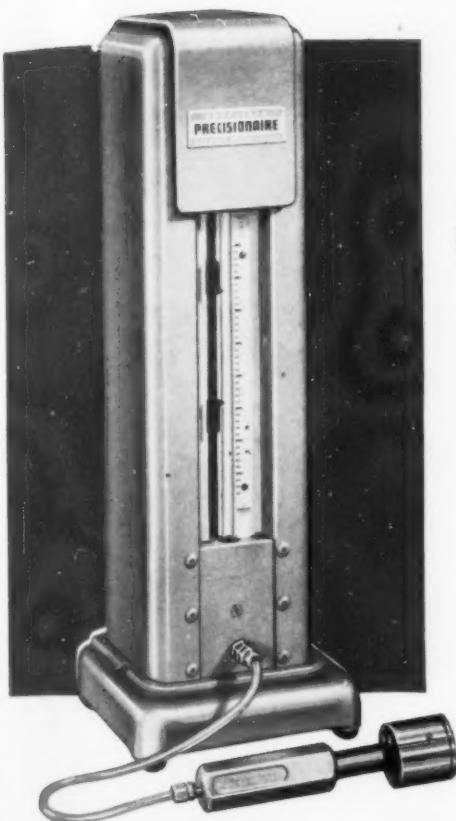
Osborn Brushes

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WORK PART TOLERANCE

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Gage Division, The Sheffield Corporation,
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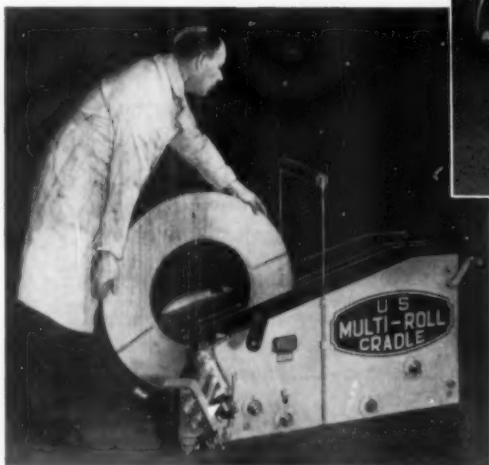


SHEFFIELD

**For maximum press room efficiency . . . For controlled
unwinding of all types of stock in coils . . .**

THE U. S. MULTI-ROLL CRADLE

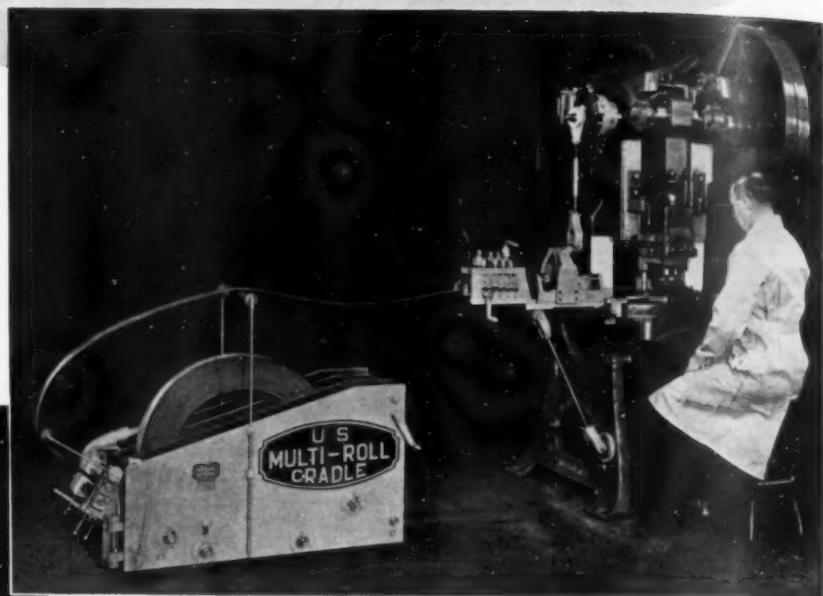
U. S. Multi-Roll Cradle Model ACC-1-9C, with four power-driven rest rolls plus a pair of power-driven take-out rolls. A geared motor of 1.3 H.P., 155 R.P.M. gives output speeds up to 80 feet per minute. For special applications other motors can be provided. The cradle will handle stock up to $\frac{1}{8}$ inch in thickness, 9 inches in width, and coils with OD up to 40 inches. Photo shows Multi-Roll Cradle set up with a U. S. Stock Straightener and a U. S. Slide Feed to make the press completely automatic.



Above: In the smaller sizes, coils of stock can be easily rolled into the cradle by one man. During the loading the take-out roll assembly is released by a trigger latch and swung to the side. It snaps securely into place when swung back into operating position.

**The following U. S.
Press Room Equipment
will be on display and
in operation at Booth
1089, Western Indus-
trial Exposition, Los
Angeles, March 14-18.**

**U. S. Automatic Coil Cradles
U. S. Slide Feeds
U. S. Plain Stock Straighteners
U. S. Power Driven Straighteners
U. S. Scrap Chopper**



See it at the Western Industrial Exposition

The U. S. Multi-Roll Cradle has been designed to enhance press performance by unwinding stock in a steady, smooth run under complete control at all times. This is accomplished with four power-driven coil rest rollers mounted in self-aligning bearings and arranged in an arc to equalize weight distribution. In addition, on Model ACC-1-9C further power is provided by a pair of power-driven take-out rolls to completely unwind coils which have a tendency to sag or slip when rest rolls only are used. Both sets of rolls are actuated by a loop control arm which operates through a micro switch. The stock can pass over the loop control roller or press against it; either way, the feed to the press is positive and constant and can be adjusted to rates up to 80 feet per minute. When handling some types of coils the power-driven take-out rolls may not be required and the cradle can be purchased with the four power-driven coil rests only (Model ACC-1-9NT). On this unit the power-driven take-out rolls can be easily added later if needed.

The U. S. Multi-Roll Cradle is also designed for easy and rapid coil loading, and the compactness of the frame and the controlled unwinding feature make it possible to set it up close to the press for most economical and safe use of floor space.

**Get full details and specifications of the U. S.
Multi-Roll cradle in special bulletin 90-T.
Write for your copy today.**

U. S. TOOL COMPANY, Inc.

Ampere (East Orange)

New Jersey

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For Mr. Tooley typifies the unique position that Firth Sterling occupies among producers of tools and tooling materials . . . that of making and selling both steels and carbides . . . the right steel or carbide or the exact combination needed to do each job best . . . from a single manufacturing source.

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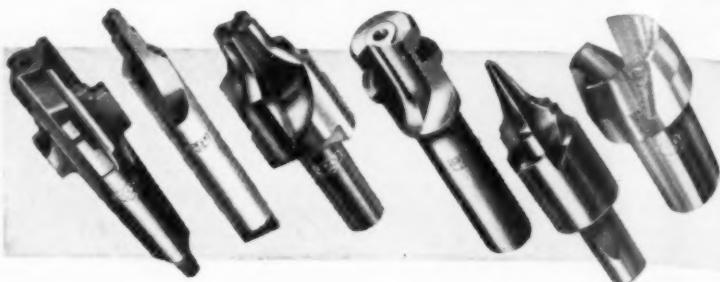
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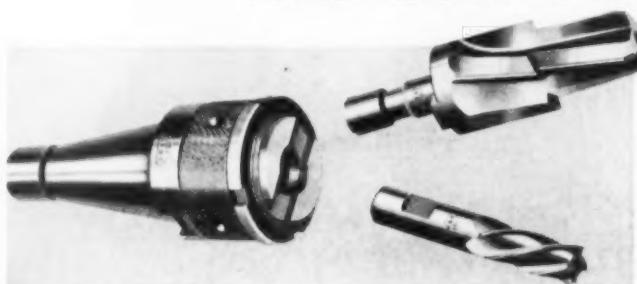
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WEJ-LOK TOOL HOLDERS



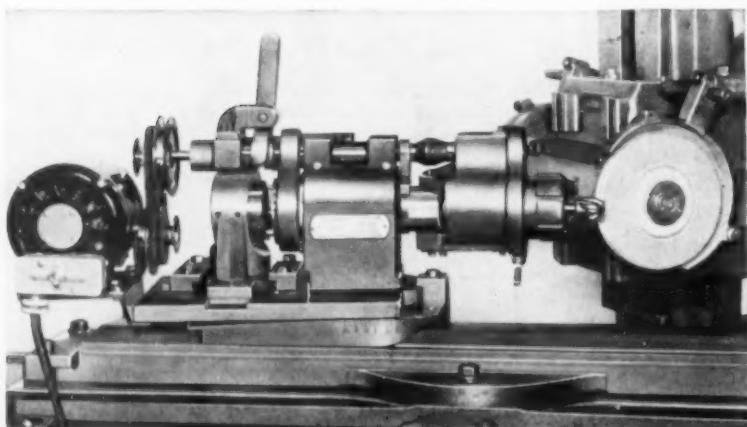
A simple hand spinning of Wej-Lok retainer ring locks or unlocks inserted tools—no wrenches or other tools are required. Positive locking that eliminates tool play or wobble is accomplished by grinding a flat area on tool shank to match holder wedge. For a superior tool holder on all your drilling, reaming, boring and milling operations—specify Wej-Lok.

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Grip-Tip Centers are specifically designed to reduce your replacement costs and machine down-time. It takes but a minute to remove and replace the double end male or female carbide tips. Also, the life of Grip-Tip holders is practically unlimited because only the carbide tips are reground.



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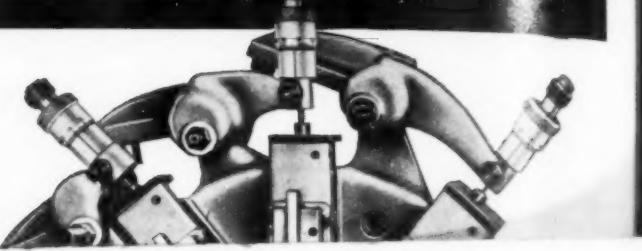
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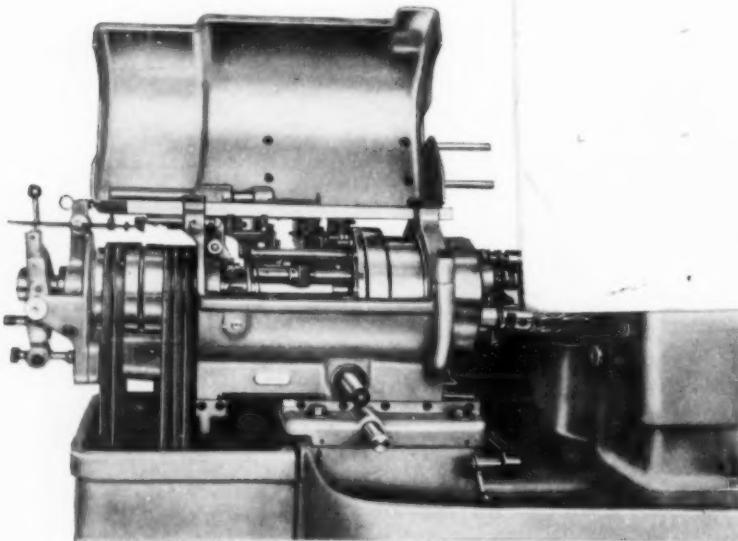
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- Service centers in New York and Los Angeles—factory trained men will plan layouts, produce tools, cams, and make set-ups.
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—nationwide sales and service of precision machine tools—
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TIGH BOU

other intricate precision parts with multiple end operations including internal and external threading. Comes in 3 sizes with diameter capacities from $1/32"$ to $1\frac{1}{4}"$. Maximum turning length is 9".



Enlarged cross-section of a nozzle: $3/8"$ dia., $3/4"$ long, three holes of different sizes, internal and external thread, and knurl.

CUSHMAN chucks

give

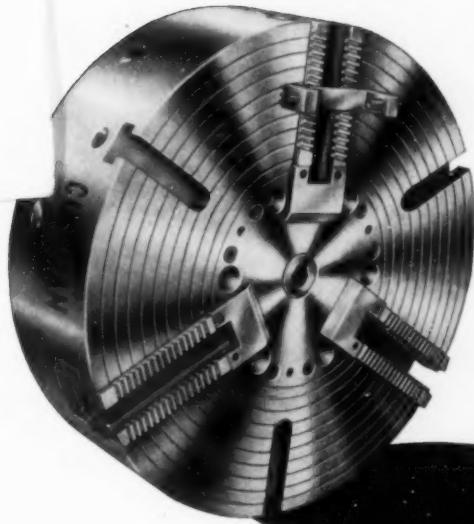
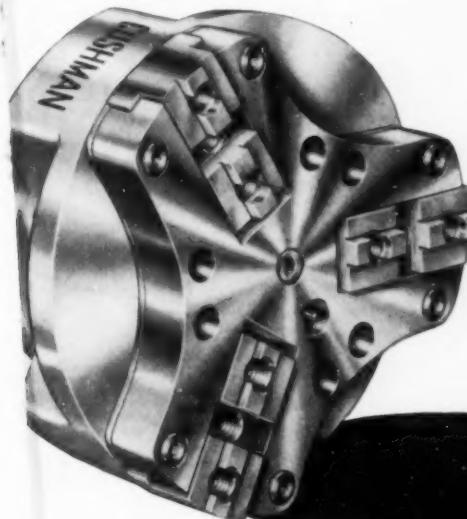
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Chuck-ability is available to you in Cushman's complete line of manually and air operated precision chucks, designed and manufactured to meet today's high metal working quotas and lower production costs.

Write today for catalogs fully describing Cushman Chucks. If you should have a particular work-holding problem, Cushman can give you Chuck-ability in a special chuck, designed and engineered to your requirements.



THE CUSHMAN CHUCK COMPANY • Hartford 2, Connecticut

A world standard for precision



SEE YOUR INDUSTRIAL DISTRIBUTOR

manufacturers of:

Air Operated Chucks, Cylinders, and Accessory Equipment . . . The Cushman

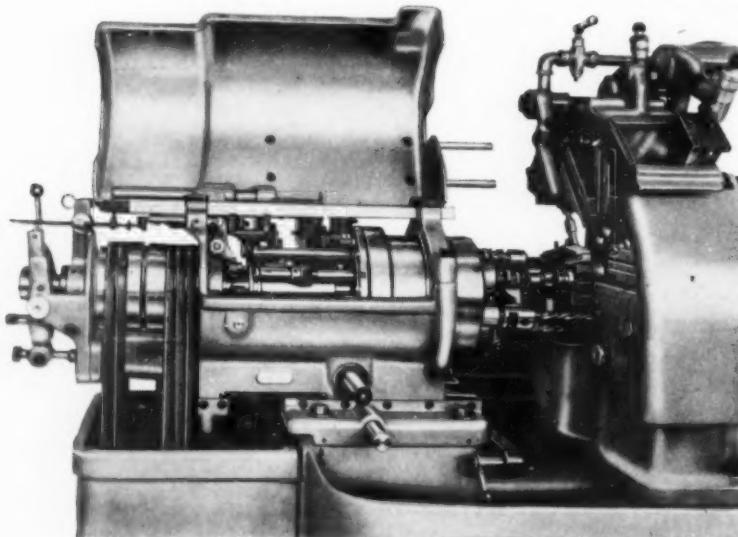
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ASTE Western Industrial Exposition

DO THEY SET TOLERANCES CLOSER THAN YOU CAN DELIVER?

GET A

BECHLER SWISS AUTOMATIC

Job sheets are specifying closer tolerances all the time. With Bechler Swiss automatics you can turn workpieces to within tenths. Furthermore, Bechlers are built in 2 different models—the latest with drum-turret is made in 3 sizes, the standard in 4—so you can get the one that fits your production needs (in short, you don't have to buy more machine than you want).



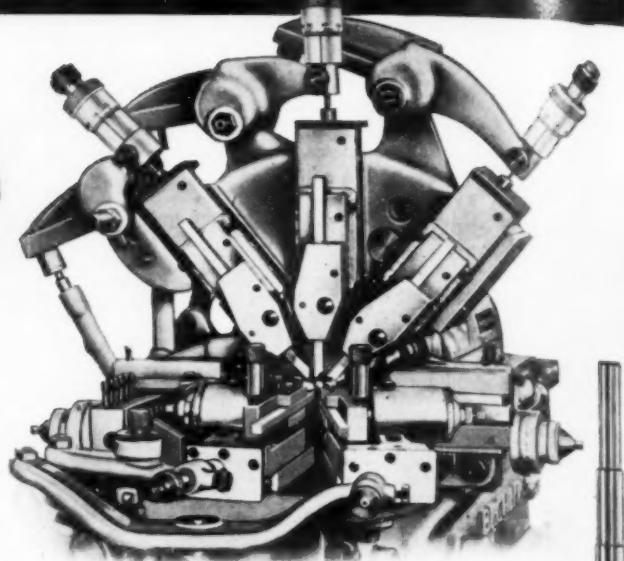
- Service centers in New York and Los Angeles—factory trained men will plan layouts, produce tools, cams, and make set-ups.
- Complete stock of attachments, spare parts, and cams.

Let us recommend the right Bechler for your precision job. Or, write for bulletin.

COSA

—nationwide sales and service of precision machine tools—
—from bench lathes to boring mills.

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.



Bechler standard Swiss automatic—5 single-point tools for turning pins, staffs, arbors, shafts, pinions, and studs. Comes in 4 sizes with diameter capacities from $1/32"$ to $1\frac{1}{4}"$. Maximum turning length is 9".

Stainless steel shaft $3/8"$ dia., $2\frac{3}{4}"$ long, diameters held to .0003", concentricity .0005", finish 16 micro inch.

Bechler drum-turret Swiss automatic—12 work stations include 5 cross tools, 6 turret positions, and 1 pick-up position. For machining hubs, fittings, valves, housings, couplings, nozzles or other intricate precision parts with multiple end operations including internal and external threading. Comes in 3 sizes with diameter capacities from $1/32"$ to $1\frac{1}{4}"$. Maximum turning length is 9".



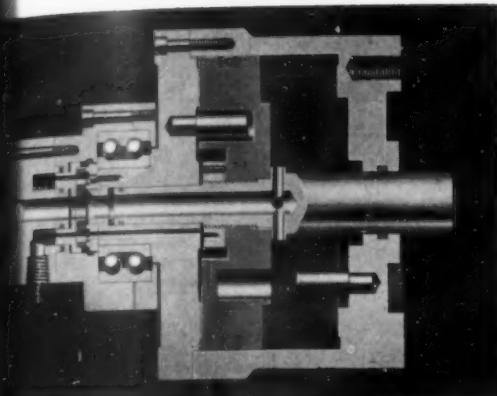
Enlarged cross-section of a nozzle: $3/8"$ dia., $3/4"$ long, three holes of different sizes, internal and external thread, and knurl.

CUSHMAN chucks

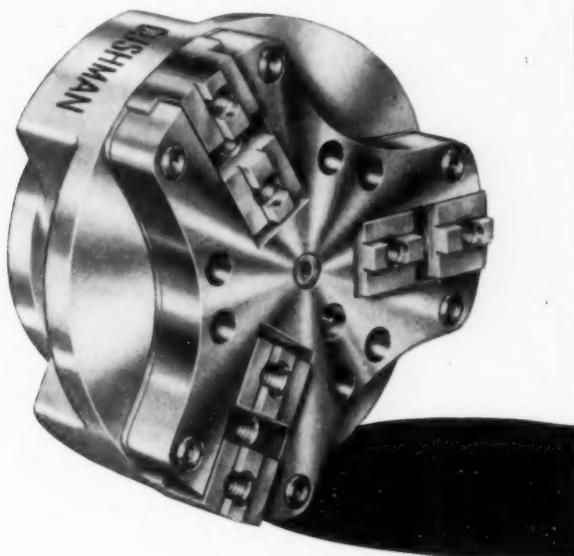
give

Chuck-ability

CHUCK-ABILITY: The ability to SPEED your work
... ELIMINATE fatigue ... IMPROVE your products
... and REDUCE your costs ... through design
and selection of the right work-holding devices.



Typical Cushman Air Operated Chucks and Cylinders for repetitive machining operations permitting increased production at lower costs.



The key to machining efficiency

Today's repetitive manufacturing demands efficient and economical operation of high speed machine tools. Cushman Air Operated Chucks and Cylinders give you Chuck-ability with satisfactory performance under the punishment of constant day-in and day-out service . . . no loss of chuck or cylinder efficiency over a long service life . . . no air leakage problems . . . and the feature of quick loading and unloading of workpieces at the touch of foot or hand.

Chuck-ability is available to you in Cushman's complete line of manually and air operated precision chucks, designed and manufactured to meet today's high metal working quotas and lower production costs.

Write today for catalogs fully describing Cushman Chucks. If you should have a particular work-holding problem, Cushman can give you Chuck-ability in a special chuck, designed and engineered to your requirements.



THE CUSHMAN CHUCK COMPANY • Hartford 2, Connecticut

A world standard for precision



SEE YOUR INDUSTRIAL DISTRIBUTOR

Visit us at Booth No. 652
ASTE Western Industrial Exposition

manufacturers of:

Air Operated Chucks, Cylinders, and Accessory Equipment . . . The Cushman



From the invention of the combination square to a line of more than 3000 fine tools. From a room in a small machine shop to the largest manufacturing plant in the world devoted exclusively to the production of mechanic's hand measuring tools and precision instruments, dial indicators, hacksaws, band saws, band knives and precision ground die and flat stock. This is the contribution made to industry and to millions of skilled craftsmen by Laroy S. Starrett and the company which he founded.

On the occasion of our 75th Anniversary Year, the many Industrial Supply Distributors who make STARRETT products available to you through a convenient and reliable source of supply join us in our pledge to maintain and increase the STARRETT reputation for quality and precision — and for prompt, dependable service.

Starrett®

"WORLD'S GREATEST TOOLMAKERS"

MECHANICS' HAND MEASURING
TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES
PRECISION GROUND FLAT STOCK • HACKSAWS, BAND SAWS and BAND KNIVES
THE L.S. STARRETT COMPANY, ATHOL, MASSACHUSETTS, U.S.A.

VISIT THE STARRETT EXHIBIT: Space 765, ASTE Western Industrial Exposition
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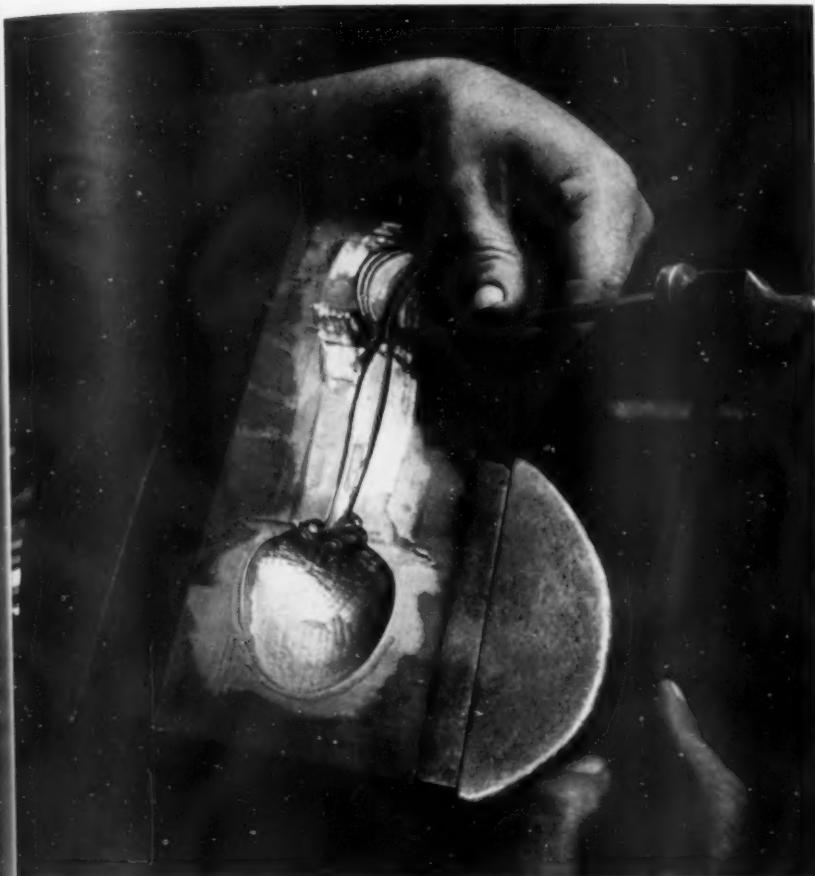
Tool Steel Topics



Bethlehem products are sold
through Pacific Coast Steel Corporation

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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Maker of Tableware Likes Economy of Striking Die of Bearcat

A maker of stainless steel tableware had been using striking dies which produced average runs of 19,000 pieces. Good, they thought, but perhaps by experimenting they could find something better. So they decided to switch to Bethlehem Bearcat Tool Steel, then watch their production figures. The number of pieces per die doubled, right from the start.

The Bearcat dies, used in working grade-rolled stainless blanks of varying thickness, are hardened to Rockwell C 56-58. As no redressing is possible, they are run until failure occurs. The shop superintendent says: "Bearcat is doing a phenomenal job. We particularly like its resistance to shock."

Besides shock-resistance, Bearcat is

well suited for any application where good machining is essential. It is deep-hardening in air, and offers low distortion in heat-treatment. For some applications, it can be carburized easily for long wear.

TYPICAL ANALYSIS

C	Mn	Si	Cr	Mo
0.50	0.70	0.25	3.25	1.40

In addition to its use for striking dies, Bearcat is also ideal for master hobs and engraving dies, used in related industries. You're sure to like Bearcat, no matter where you try it. Why not order a supply today from your local tool steel distributor, or from our well-stocked mill depot.

BETHLEHEM TOOL STEEL ENGINEER SAYS:



*You Can Reduce Warpage
by Supporting Tools
During Heat-Treatment*

Warpage of tools in heat-treatment is usually associated with the geometrical shape of the tools, or the manner in which they are supported during heating for the quench. When steels are heated in the critical range, just prior to quenching, they are weak, and if not supported properly, will sag or flow plastically.

Long tools should be supported at frequent intervals along their length. If section changes are present for appreciable lengths, the tools should be supported at each section. However, the span between supports should not exceed three times the tool diameter.



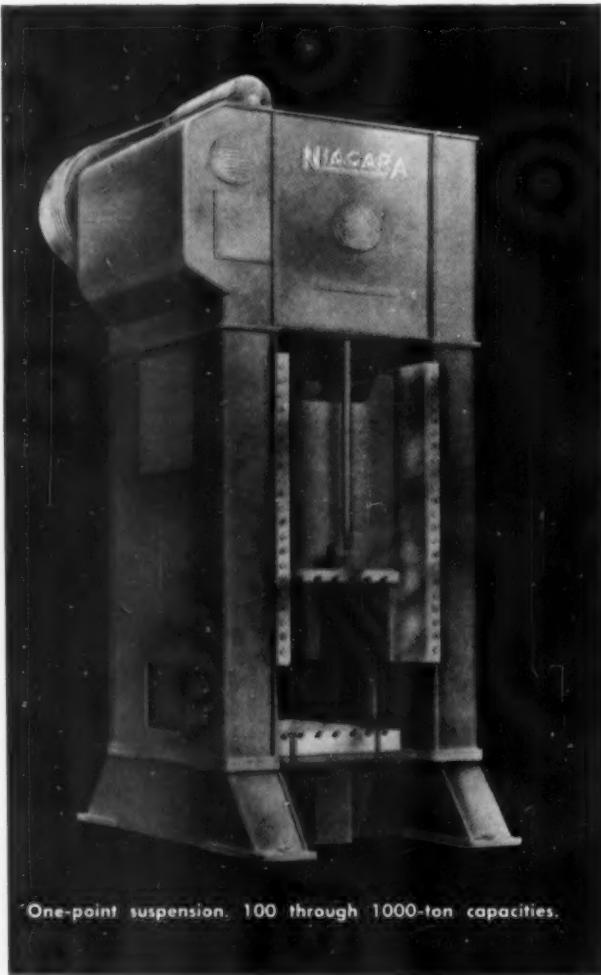
LEHIGH S SLITTER KNIVES MAKE SHORT WORK OF STRIP STEEL

These knives, made of Bethlehem Lehigh S tool steel, are slitting cold-rolled strip steel to proper width, preparing it for a punch-press operation making sheet-metal parts. Lehigh S is our oil-hardening type of high-carbon, high-chromium tool steel. Its high hardness and maximum resistance to abrasion make it a steel with the ultimate in wear resistance.

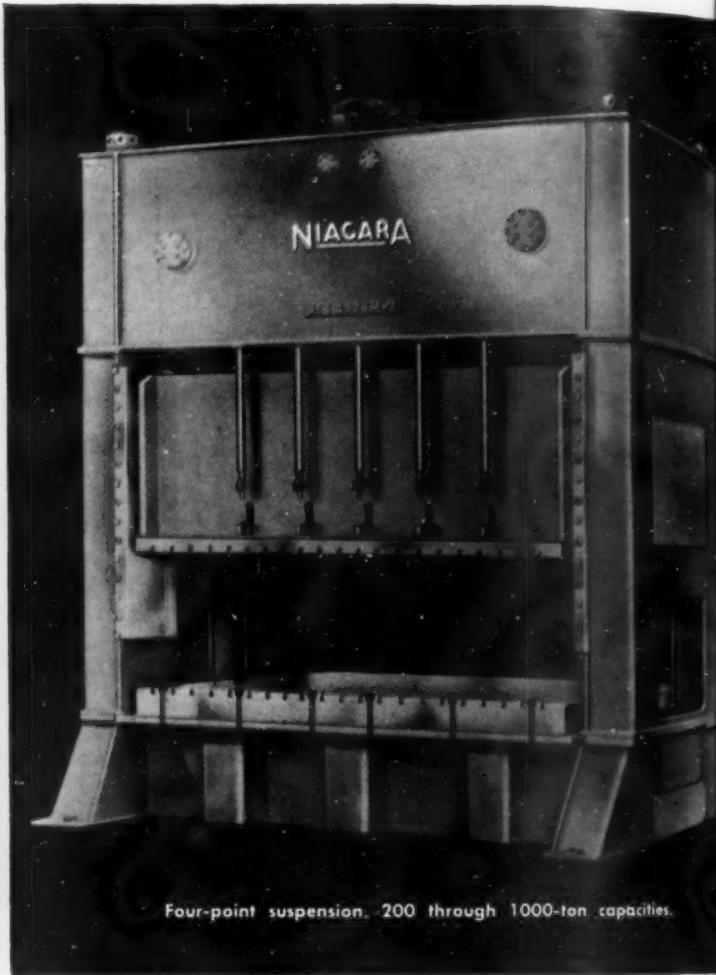
NEW!

MASTERFULLY ENGINEERED

excels in large, heavy tonnage



One-point suspension. 100 through 1000-ton capacities.



Four-point suspension. 200 through 1000-ton capacities.

► ECCENTRIC DRIVE DELIVERS GREATER TORQUE WITH LESS DEFLECTION

In Niagara Series SE Presses, the eccentric is an integral part of the main gear (or gears) which rotates on a stationary pin rigidly supported in the crown, close to the point at which the pressure is exerted. Serving merely as a pivot, the pin carries no torsional load and relatively little bending load. Net result: Niagara's eccentric gear design can deliver greater torque with less deflection than other types of construction.

► RUGGED, RIGID, ALL-STEEL FRAMES PROVIDE GREATER ACCURACY, LONGER DIE LIFE

Frames are rugged, all-steel, four-piece, tie-rod construction of great strength and rigidity, stress relieved in a furnace and thoroughly grit-blasted before machining. Each frame size has been scientifically tested for deflection to meet Niagara standards—the most exacting in the industry.

► LOW INERTIA, PNEUMATIC FRICTION CLUTCH RUNS COOLER, WEARS LONGER

Most of the weight of the Niagara clutch continues to rotate with the flywheel. Only the drive shaft and driving plate start and stop with each cycle. The resulting low weight and inertia of the parts, picked up during clutch engagement, greatly reduce heat and wear. As the clutch rotates, it acts as a centrifugal blower, providing positive ventilation. Plates automatically compensate for normal wear with no adjustment necessary.

► MODERN, STREAMLINED DESIGN EMPHASIZES COMPACTNESS

The entire driving assembly is neatly housed in the crown. There is no exposed, overhanging flywheel, clutch, brake, shaft nor motor in the rear of the press to obstruct crane service, block light, throw grease or consume space unnecessarily.

LINE OF METALWORKING CHAMPIONS

drawing, punching and blanking work



Two-point suspension. 200 through 1000-ton capacities.

Without equal in engineering design, performance and stamina, this great new line of Niagara Straight Side Eccentric Geared Presses is every inch a champion. It is an outstanding example of the advanced thinking that has made Niagara the pace-setter among builders of metal working machines for 75 years.

Masterfully engineered and ruggedly constructed to handle a tremendous variety of work, the new Niagara SE Series is the most practical and dependable press line built for:

- Work requiring large die areas.
- Heavy tonnage demands.
- Long stroke, deep drawing jobs where work is engaged high up on the stroke.
- Bottom-of-stroke blanking and punching.

THE COMPLETE STORY IS READY FOR YOU NOW!

Make a feature-by-feature appraisal of what these great new presses can do for you. Write for newly published, illustrated Bulletin 66. It will be forwarded promptly without obligation.



NIAGARA MACHINE & TOOL WORKS • BUFFALO, 11, N.Y.

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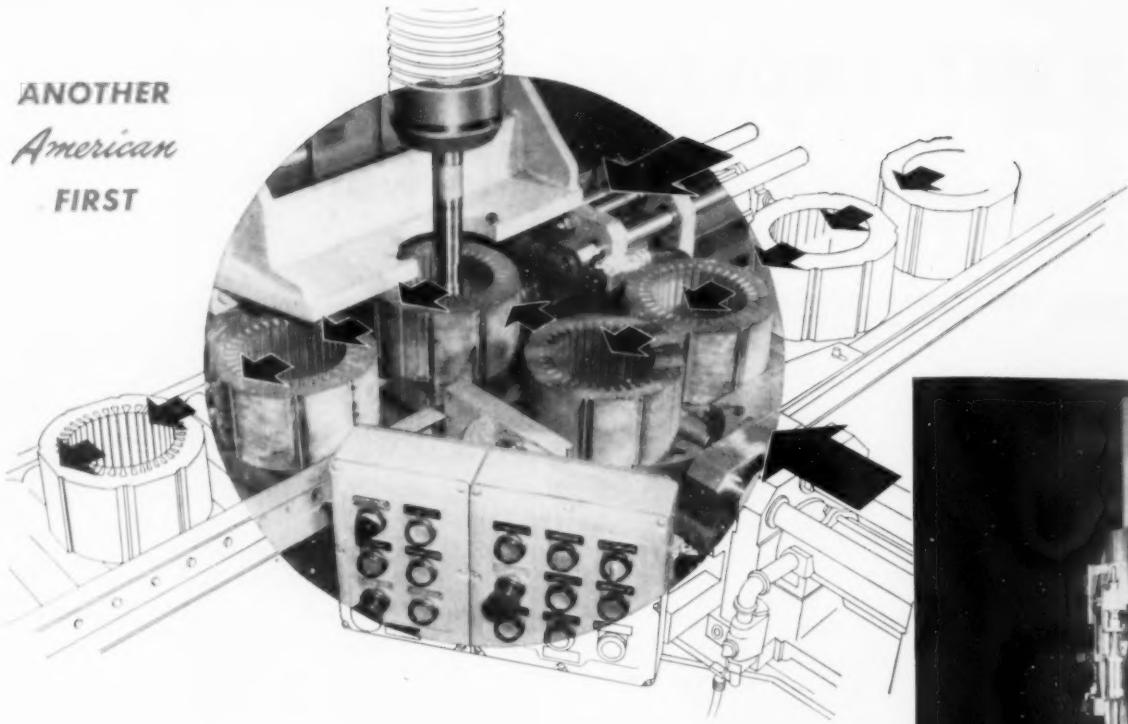
DELUXE OPERATING CONTROLS INSURE UTMOST SAFETY, EFFICIENCY AND CONVENIENCE

Compactly and conveniently arranged on a master panel, Niagara controls are instantly accessible for fingertip direction of every press operation: starting, slide adjusting, jogging, die tryouts, running and stopping. The latest safety devices provide maximum protection for die setter, operator and the press itself. Nothing has been overlooked. Trial runs assure that all controls are in proper working order before each Niagara press leaves the plant.

NIAGARA

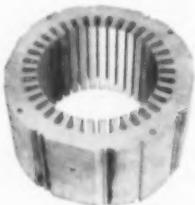
Straight Side
Eccentric Geared
Presses

ANOTHER
American
FIRST

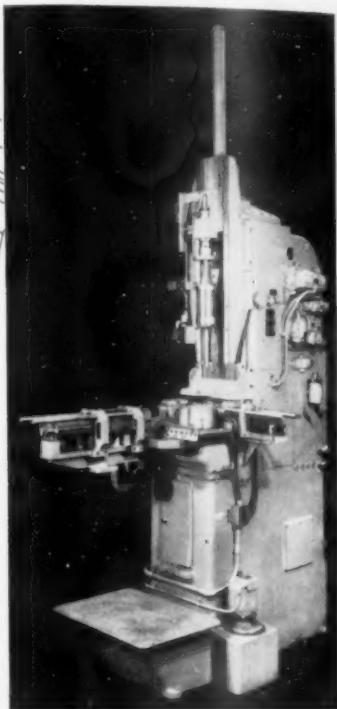


...completely AUTOMATED BROACHING

STATOR PARTS BROACHED IN 20 SECONDS



Installed in a conveyor line, this American 3-way broaching machine with a hydraulic broach retriever and electrical controls, broaches the I.D. of stator parts in a 20 second cycle. Parts coming into the machine are automatically shuttled into position, broached, and then discharged back on the conveyor line. Interchangeable broach arbors and broach shells make it possible to broach several different parts of similar size.



FOR AUTOMATED
OR INDIVIDUAL
BROACHING PROBLEMS

SEE *American*

American approaches each broaching problem as part of the complete production cycle. Broaches, fixtures and machines — all designed and built by American — provide a complete broaching service. Let American help you cut your production costs. Send part print or sample to get the solution to your broaching problem. Ask for Catalog No. 450.

BEVEL GEAR BLANKS BROACHED IN 15 SECONDS



Using tooling similar to that illustrated, an American (PD) pull-down machine, installed in a conveyor line, automatically broaches the I.D. of a bevel gear blank in 15 seconds. By using interchangeable broach arbors and broach shells, over 20 similar bevel gear blanks are broached with this set-up.

American BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.



American Building - Ann Arbor, Michigan

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

for
surface
accuracy

SIMONDS
ABRASIVE CO.

ROLL
GRINDING
WHEELS

MOS 830 RPM
TESTED

SIMONDS
ABRASIVE CO.
SI 5859



For the right finish start with Simonds Roll Grinding Wheels. Fast, cool, free cutting action. Used for regrinding and refinishing everything from giant back-up and work rolls to small jewelers rolls. Borolon (aluminum oxide abrasive) for steel and alloy steel rolls. Electrolon (silicon carbide) for chilled iron, cast iron, brass, copper and non-metallic rolls. Write for free bulletin ESA 237 "Roll Grinding Wheels for Surface Accuracy".

SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

Branch Warehouses: Boston, Detroit, Chicago, Portland, San Francisco • Distributors in Principal Cities
Division of Simonds Saw and Steel Co., Fitchburg, Mass. • Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y.,
Simonds Canada Saw Co., Ltd., Montreal, Quebec, Lion Grinding Wheels Div., Brockville, Ont. and
Simonds Canada Abrasive Co., Ltd., Arvida, Quebec



How to Cut the Cost of Gaging Threads

with TAFT-PEIRCE JOB-RATED GAGES

The best gage for most jobs provides the best combination of speed, wear-resistance, upkeep, and initial cost. Here are some comparisons that will help you keep costs to a minimum.

Thread Plugs



T-P Limit Thread Plug Gage. Standard hardened steel gages are lowest in initial cost and are preferable when soft or moderately hard materials are being inspected in limited quantities. Taper-Lock up to 1.510". Reversible from #0 to $\frac{3}{4}$ ". Reversible Tri-Lock above 1.510".

Rings & Snaps



T-P Thread Ring Gages. Lower in initial cost than other gages for external threads, they check a combination of all thread errors but cannot distinguish between them.

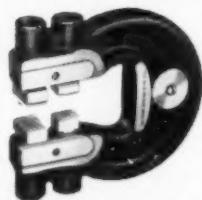
Special Gages



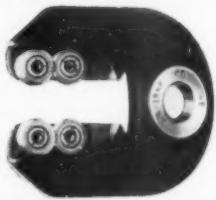
T-P Rotochek (Flexible Shaft Model). Fastest thread gaging method yet devised. Push—and the gage screws into the work. Release the pressure and it stops. Pull—and it disengages. Can be used with most standard T-P plug or ring gages.



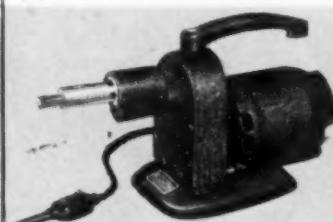
T-P Electrified Gages. With only a modest increase in initial cost, substantially longer wear life can be obtained with this exclusive surface treatment. Many users report up to 3 times longer gage life.



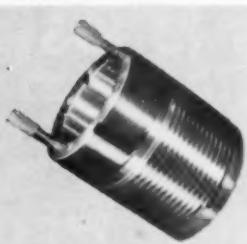
T-P Adjustable Thread Snaps. Faster than ring gaging, and just as accurate, they check lead, angle, and all other thread elements. Pitch diameter is variable.



T-P Roll Thread Snaps. Same as adjustable, with rolls for gaging members. Since gaging members rotate, wear is spread over greater surface and service life increased.

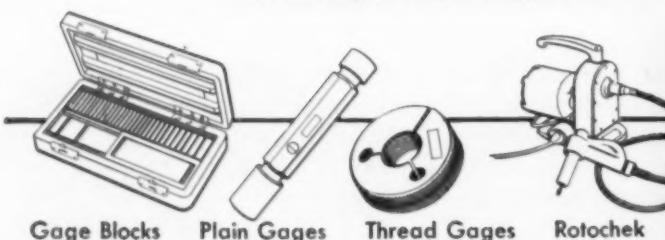


T-P Rotochek (Bench Model). Permits bringing work to gage, instead of gage to work. Like flexible shaft model, records indicate it triples rate of parts inspection.



T-P Thread Concentricity Gage. Typical of the infinite variety of special gages made to order by T-P every year. This one checks size and location of internal threads.

For the complete story on these items and many more, send for your copy of the Taft-Peirce Handbook.



*T-P means
Top Precision*



THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, R. I.



standard for comparison

*...and with high speed steels
the standard is REX*

Living up to a standard for comparison isn't easy. That's why Crucible lavishes special care on the manufacture of REX® high speed steels...to keep REX the *standard* wherever high speed steels are used—as it has been for over half a century.

It's easy to prove the superiority of REX. Use it on the job...check its size, structure, response to heat treatment, fine tool performance. You'll agree with thousands of other users—you can't find a high speed steel to outperform REX.

Remember, REX is made only by Crucible. So call for REX at any Crucible warehouse, or for quick mill delivery. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 30, Pa.*

Visit us at Booth 350
Western Metal Show
Los Angeles—Mar. 28-Apr. 1

CRUCIBLE

first name in special purpose steels

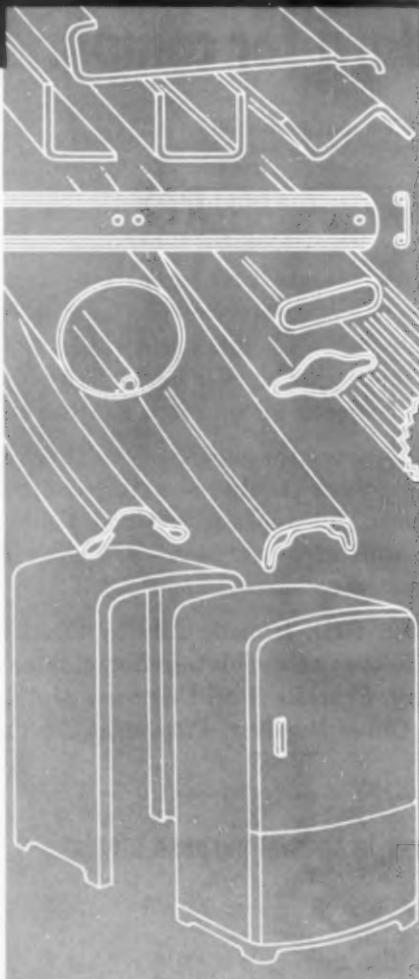
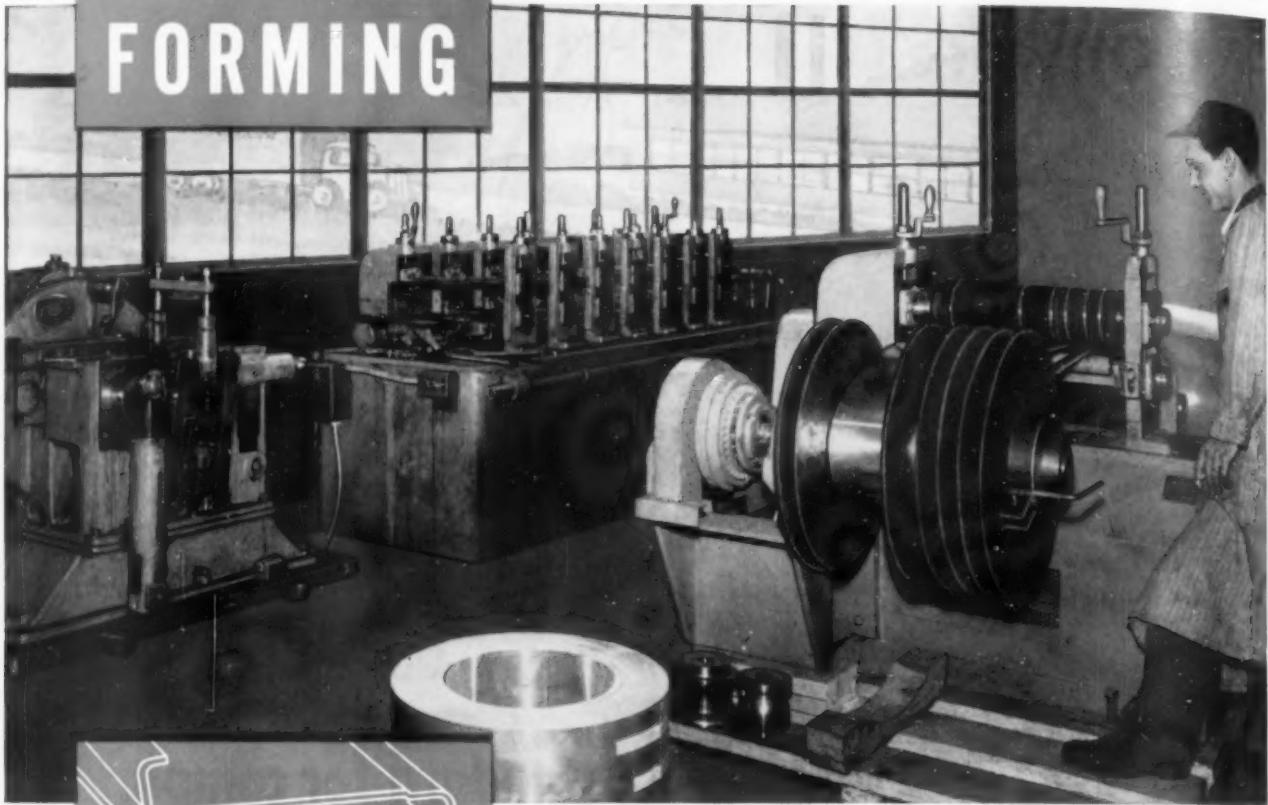
Crucible Steel Company of America

March 1955

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-63

COLD-ROLL FORMING

Yoder Cold Roll Forming Machine with Shear Type Automatic Cut-Off and Small Slitting Line installed by Wolverine Mouldings, Inc., Lincoln Park, Mich.



for the Growing Business

● As your business grows, new opportunities arise for drastic cost reduction through the use of cold roll formed parts or finished products.

Decorative metal mouldings is only one of a great many things you can make with a Yoder cold-roll forming machine.

For instance, you can economically make structural angles, channels, etc., up to $\frac{1}{2}$ in. thick. You can form wide sheets or panels into cabinets or shells for refrigerators, ironers, lockers, radio and TV sets, etc. You can make virtually all the components for metal buildings, including trusses, joists, studs, siding, roofing, windows, and doors.

Edges of shapes can be folded in and over to make interlocking joints for cabinets, rolling doors, box and tubular products.

You can, in addition to longitudinal forming, do perforating, notching, embossing, coiling, curving, welding, etc. Sections can be cut to length and ends given almost any shape, plain or fancy, by means of one or two Yoder automatic cut-off machines synchronized with the forming speed.

The Yoder Book on Cold-Roll Forming is an illustrated treatise on the art, the machines and many of the things they can do to reduce cost and increase production. A copy is yours for the asking. Consultations and estimates without cost or obligation.

THE YODER COMPANY • 5525 Walworth Ave., Cleveland 2, Ohio

Complete Production Lines

★ COLD-ROLL-FORMING and auxiliary machinery

★ GANG SLITTING LINES for Coils and Sheets

★ PIPE and TUBE MILLS — cold forming and welding



PARKER - MAJESTIC



PRECISION MACHINES

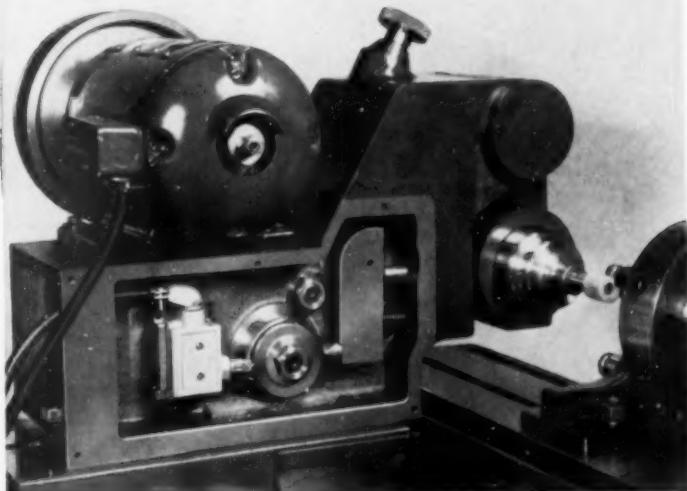
THE SEMI-AUTOMATIC INTERNAL GRINDER

Surprisingly Low in Cost with Greater Production



A new machine developed by
the makers of fine precision
grinders for over a quarter
of a century.

AUTOMATIC SPINDLE IN-FEED-CAM ACTUATED



Automatic sizing unit sufficiently versatile for production of one or many pieces. Accurately repeats on additional pieces after completing finished size set up on first piece. Available on either 12" or 24" table travel machines.

Table travel is accomplished by any one of three methods.

1. HAND FEED
2. RECIPROATOR
3. POWER FEED MECHANISM

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PARKER-MAJESTIC, Inc.
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Top Tool Conditioning

WITH BAY STATE WHEELS!

Quality cutting tools boost production and cut costs *only* if they are kept in quality condition!

For single point tools or complicated cutters . . . steel or carbide . . . there is a BAY STATE wheel to keep quality high and cutting performance at peak efficiency.

Ask your BAY STATE distributor about tool grinding "Wheels of Progress" that keep pace with the rapid progress of modern tools.

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Here are top tool-conditioning specifications in "Wheels of Progress" . . . well over 150 of them . . . each thoroughly proven by industrial use.
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These specifications and BAY STATE's "On-The-job" engineering service are an ideal combination for your progress in Tool Room grinding.



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high production-60 tons' worth

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There's a way that the efficiency of a Clearing O.B.I. can solve a production problem for you. It gives you the kind of smooth operation your operators will go for and the ruggedness that comes through for you in the pinches. We'd be glad to talk to you personally about these things. Why not call us?

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The Tool Engineer

Congratulations West Coast!

At long last the West Coast Chapters are having their chance to shine. These chapters are directly responsible for our first Western Industrial Exposition this month in Los Angeles. The enthusiasm and demand for this show started five years ago and, with the wonderful cooperation of all the West Coast Chapters, overwhelming success is assured.

The growth of industries along our western shores is reflected in the demand for more and more tool engineers, and the tool engineers have demanded more and more technical information. Expansion of ASTE in this area was inevitable because our Society fosters the education and improvement of the tool engineer through its monthly technical meetings, *Tool Engineers Handbook*, On-Campus Conferences, THE TOOL ENGINEER magazine and tool engineering expositions such as this present one opening March 14.

During the week of the Exposition our Annual Meeting will be held. National Delegates from each of our 124 chapters will assemble at Los Angeles to elect our Directors and conduct other business of our Society. The meeting of the House of Delegates is one of the fundamental reasons for the spirit and growth of our Society. The individual member's voice is expressed through his Delegate, and in truth governs our Society.

I congratulate all the West Coast members on their spirit and initiative in arranging this Exposition and Meeting, and offer special bouquets to Director Ben Hazewinkel and Secretary Wayne Ewing for their untiring efforts in helping the tool engineer on the West Coast.

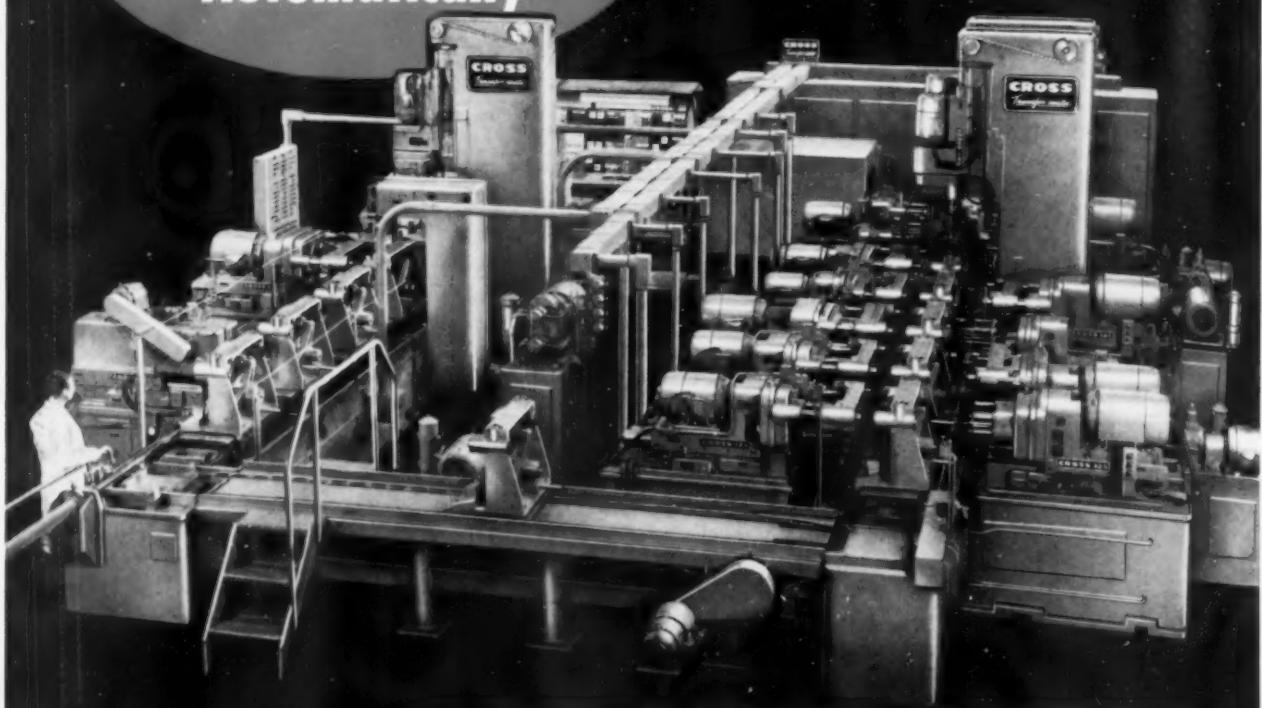
Joseph P. Crosby

PRESIDENT
1954-1955



**Machines
Flywheel Housings
and Changes Set Up
Automatically**

Another Transfer-matic by Cross



- ✖ Completely machines (except for grinding three faces) flywheel housings for both standard and automatic transmissions.
- ★ Flexibility for scheduling because either part may be produced as required—set up changes and proper tools are selected automatically at each station.
- ✖ 170 pieces at 100% efficiency.
- ★ 49 drilling, 22 chamfering, 4 reaming, 2 counterboring, 2 boring, 30 inspecting, and 30 tapping operations.
- ★ Palletized work holding fixtures with automatic transfer from station to station.
- ★ Hydraulic power wrench for clamping parts.
- ★ Other features: Complete interchangeability of all standard and special parts for easy maintenance; construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; automatic lubrication.

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Opportunities in tool engineering

By Ralph H. Eshelman
Associate Editor



TOOL ENGINEERING affords many personal satisfactions and a solid foundation on which to build a career. In fact, virtually the only limitations in this field are the abilities, initiative and energy of the individual himself. The boundaries are as wide as industry itself and as high as the top rungs of the management ladder.

Tool engineers have become company presidents, top level manufacturing executives, plant managers, executive engineers and consultants. Also, tool engineers have achieved notable success in sales and service, in education and even in politics.

One factor which has a bearing on opportunity is the current peak demand for all types of engineers. According to U. S. Census Bureau statistics and the projections of the Bureau of Labor Statistics, engineering is one of the most rapidly growing professions in the country and the trends in use of engineers will continue at least to 1960. This, coupled with the recent decline in engineering graduates, Fig. 1, has resulted in the widely publicized shortage of engineers.

Of even more specific interest is the evidence of both government and private surveys that the rate of growth of the metalworking industry is the greatest of all manufacturing industries. This increment is apparently tied to the growth of population and the expanding economy.

These factors are indicators of potentially greater

opportunities in the manufacturing field. Production rates must be continually boosted merely to maintain the present standard of living. To do this means more automatic equipment, more engineers in tool and machine design, processing, methods, layout and research. In one medium-sized plant in the machine tool field the number of tool engineers has jumped five times above the 1940 level. Yet impressive statistics in themselves may prove misleading and even dangerous if be-

*—Data from U. S. Bureau of Labor Statistics
and U. S. Office of Education.*

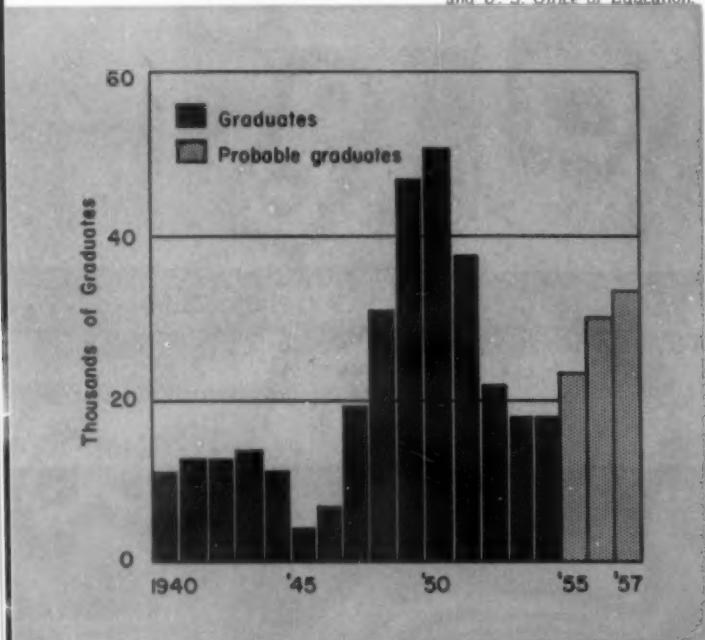


Fig. 1. Estimated current demand for engineers is 30,000 annually with a backlog variously estimated from 35,000 upward. Actual supply is greatly reduced by military service. Peak of 52,000 graduates in 1950 resulted from GI Bill students.

gaining engineers fail to realize they will still have to work out their own opportunities based on individual merit and job performance.

Because tool engineering has rather belatedly achieved recognition as a full-fledged profession and because it is a vital link between pure design and manufacturing, Fig. 2, it has been surrounded with considerable confusion. With the surging expansion of mechanization in manufacturing processes and increasing complexities of production problems and equipment, it has become clear that tool engineering embraces a far wider scope than a mere preoccupation with cutting tools, jigs, fixtures and dies. It is, in fact, concerned with all the engineering problems involved in placing a design in production as well as many other practical matters such as materials, methods, manufacturing costs, plant and equipment.

For this reason, jobs in tool engineering carry a variety of titles and cover a wide range of activity, especially in a large manufacturing organization.

For instance, in mass production industries, a manufacturing engineering organization is likely to contain such staff departments as: administrative, industrial engineering, material handling, machining process, stamping process, plant layout, manufacturing research, forward planning, design and standards. Groups responsible for a product program may include: tool planning, fabricating facilities allocation, methods, tool procurement and estimating, scheduling, control and follow-up, tool design, welding equipment, factory liaison and automation. Some of the groups such as design may be subdivided as: fixtures, dies, mechanical handling, cutting tools, tool coordination, etc.

Small Versus Large Company

In a small manufacturing company many functions are likely to be combined under one head. The contrast between these two extremes raises a controversial question as to which offers more opportunity—a small company or a large one. There is, undoubtedly, a wider variety of positions in the manufacturing side of a large organization and therefore a possibility of utilizing the unique particular abilities of individual engineers. This, of course, contributes even further to subdivision of responsibilities and specialization. Depending on goals of the individual, specialization may be a doubtful advantage. However, he becomes valuable to his employer as an expert in his line more quickly than otherwise. Also, his earnings and position may rise more rapidly.

In the long run, however, his advancement may be limited by his success in his specialized field. The higher his reputation as an expert, the less disposition there is to remove him from his field by promotion. Too, specialization has failed to prepare him for broader responsibilities, especially of an administrative or managerial nature. In this situation, the tool engineering specialist has no alternative but to enlarge his experience elsewhere, specially if he seeks a career in management.

Today 40 percent of all industrial executives are engineers, the Engineers' Council for Professional Development finds. In the future, management authorities agree, an even larger proportion must be drawn from ranks of applied scientists and engineers because of the increasing complexity of industrial technology. This is especially true of chemical, processing and manufacturing industries.

Tool engineers are in an especially strategic position in the contest for leadership because of indispensable technical ability in the manufacturing field. As one executive asserts—a man who knows manufacturing can pick up sales, finance and other viewpoints needed for managerial success, but the accountant or salesman can virtually never overcome his technical deficiencies.

Engineering students, according to a recent survey, are looking for something other than job security. They want job satisfaction, with management as the ultimate goal. Thus, for most younger engineers opportunity means opportunity for advancement—in position and prestige as well as remuneration. Many of them, imbued with this new philosophy, may find the road to that goal to be manufacturing engineering.

Some engineering educators of wide experience, such as Professor O. W. Boston, head of Production Engineering Department, University of Michigan, feel that training programs established by many of the larger corporations offer the surest opportunity for advancement, but that work in small companies may provide a broader experience base and greater personal satisfaction.

Apparently, many of the younger engineers are concerned lest they be pigeonholed on a drafting board and forgotten. At least that is a conclusion to be drawn from the executive research surveys of the National Society of Professional Engineers. The belief is often expressed that two or three years' apprenticeship on the board is enough to get the feel of the field and that from there on the engineer's ability can be better utilized in broader responsibilities.

On the other side of the picture, employers say they find many graduates deficient in practical shop background. This applies especially to those from "pure engineering courses." Cooperative programs involving alternate schooling and work are highly esteemed as are those curricula incor-

porating actual contact with production methods and processes.

While chances of production engineers rising to management are better today than ever and will increasingly improve because of emphasis on automation and ever higher expenditures for capital equipment, they should not regard their profession as an open sesame to advancement. As Professor J. E. Walters of Rutgers University Engineering Administration Department noted in an ASME paper, there is a rather general impression that engineers usually are not good administrators because of their interest in machines and physical things. He implies that they must work on development of their management talents and human relations, either on their own through supplemental schooling or aided by their company's program. Likewise, executive recruiting firms such as Heidrick and Struggles and consultants in executive development, such as Worthington Associates both of Chicago, find personality and human relations deficiencies the greatest obstacles to be overcome by engineers.

Though a managerial career may be a sentimental or traditional goal, tool engineers of sound technical ability and a basic experience background may find their opportunities in a wide variety of alternatives that are open to them.

Psychologists have long been attempting to classify people and such categories have also been applied to engineers. A. J. Alt, Assistant Chief Engineer, Administration of Chevrolet, characterizes engineers as "thing-minded, picture-minded or



Fig. 2. Sample parts and preliminary prints of a new piston design are studied by tool engineers to determine most practical and economic method of machining. Necessary design changes are then recommended to product engineering.

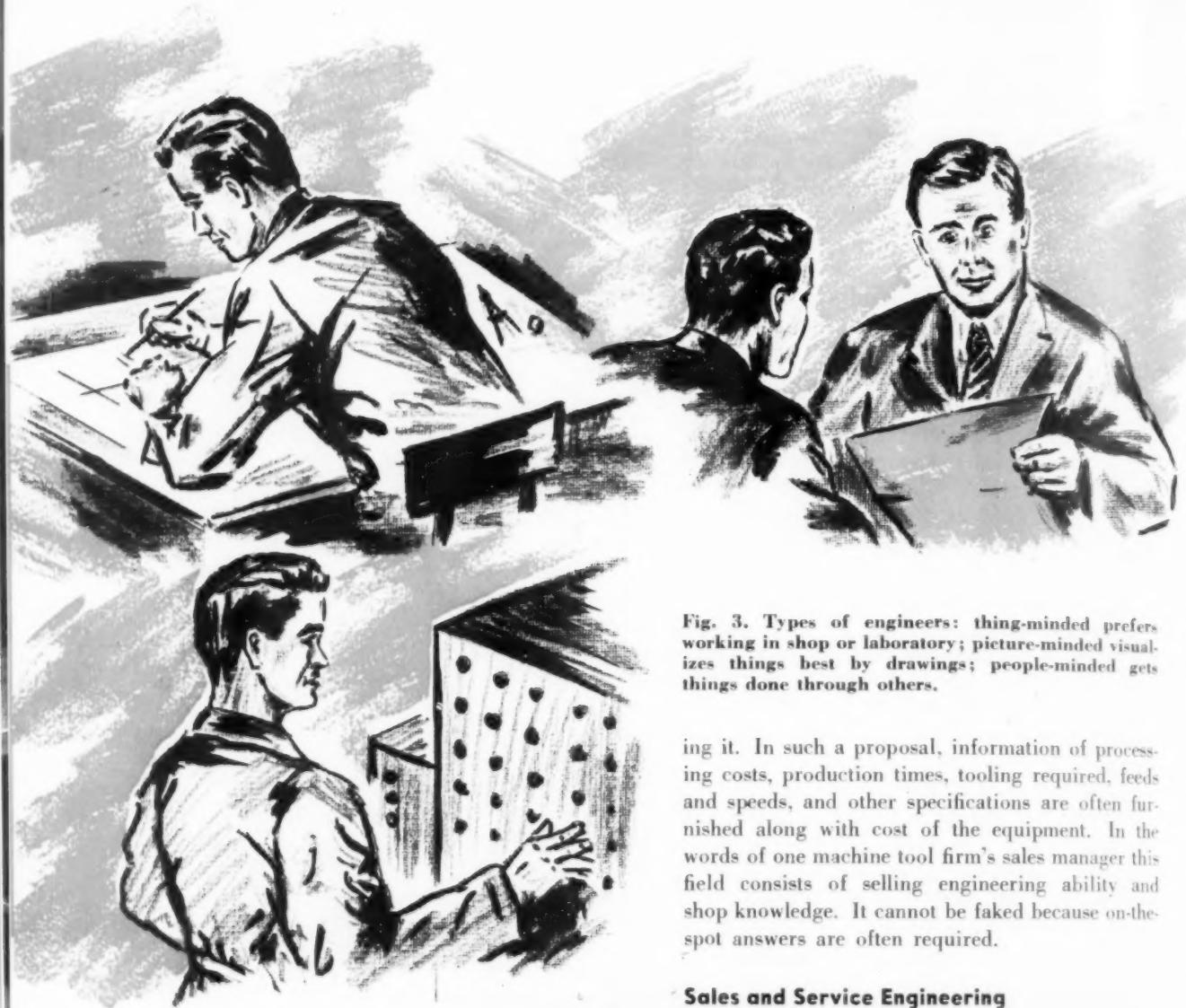


Fig. 3. Types of engineers: thing-minded prefers working in shop or laboratory; picture-minded visualizes things best by drawings; people-minded gets things done through others.

people-minded," *Fig. 3*. He explains that the thing-minded engineer feels right at home with a wrench in his hand. The picture-minded engineer loves to fondle a sharp-pointed pencil and the people-minded engineer would rather give a pep talk than to wield either a pencil or wrench. Accordingly, people-minded engineers usually end up as executives. Picture-minded engineers become design or project engineers and the thing-minded fellows become development or production engineers.

Although this may be an over simplification it does indicate the differences in personality that may occur even among engineers. Because of this there is a corresponding difference in what comprises opportunity. A people-minded engineer, for example, may want to consider sales and service engineering. Titles used in this field, indicative of this approach, are sales engineer, application engineer, field engineer, etc.

It is a common occurrence for the sales engineer to be shown an experimental part and asked to furnish recommendations on producing or finish-

ing it. In such a proposal, information of processing costs, production times, tooling required, feeds and speeds, and other specifications are often furnished along with cost of the equipment. In the words of one machine tool firm's sales manager this field consists of selling engineering ability and shop knowledge. It cannot be faked because on-the-spot answers are often required.

Sales and Service Engineering

Frequently a sales engineer is required to service his own installations, staying with them until they are in satisfactory operation and all "bugs" worked out. Sometimes service engineering does this as a separate function, but often the sales engineer has been in such close contact with a job, fostering it from idea through design and construction, that he is the most qualified representative of the equipment builder to insure proper functioning in the particular application. He may require the assistance of shop mechanics and design engineers but the over-all responsibility is usually his.

Monetary rewards for this type of work are correspondingly high, commensurate with technical ability, energy and imagination. In addition to earnings, this work is attractive to many because of the personal freedom and opportunity for further advancement it affords. The requirements are a good mechanical engineering background of from a few to ten or more years' experience, depending on its variety and nature, personableness or ability to meet people and initiative. For instance, William Goeckel, Vice President and Sales Manager of

Snyder Tool and Engineering Co., points out that a varied shop experience and personal knowledge of basic machine processes are essential.

Another important field which is rapidly growing is research and development, *Fig. 4*. For the tool engineer this largely means investigation of processes and methods. Advancements in electronics, hydraulics, metallurgy and metal removal techniques have been developing so fast that it has been difficult for manufacturing methods to keep pace. Many large companies engaged in metalworking or fabricating have set up separate establishments or technical centers for this work. Such activity offers great opportunities for a young engineer, because he has a chance to become familiar with a wide range of production problems. Also it allows him to become familiar with specialized fields.

Many progressive smaller companies are also entering on programs of research in order to maintain or improve their competitive position. For example, one such company reports that it has set up a research division with seven tool engineers engaged in developing tools for automation. In addition to private industry, government agencies, especially in ordnance and aircraft, expend large sums in process research and development.

Research as a field is likely to be even better paying than engineering jobs in industry. The qualifications, however, are likely to be higher, requiring greater experience and reputation as well as imagination and courage—courage to explore the new and untried.

Careers in Education

Perhaps one of the best ways to enter research is through advanced schooling in engineering. Both private industry and government research projects in the production field are being handled at university centers. For this reason, the teaching profession in engineering is more attractive than it has been previously. Surveys, such as those of the Engineers' Joint Council on "Professional Income of Engineers" have indicated that the basic salaries in engineering teaching are somewhat below their counterparts in private industry. Yet, the over-all income of engineering educators is equivalent if not higher. For those who like the university atmosphere, professional independence and the prestige of an established reputation, this field also offers unusual opportunity at present.

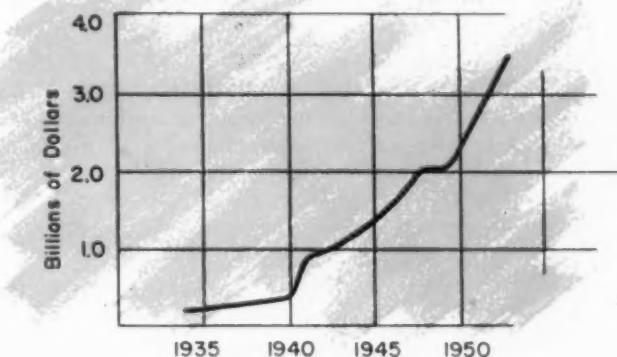
The U. S. Bureau of Labor Statistics reports that earnings are highest for engineers with the greatest amount of formal education. In most fields, it is claimed those having masters' degrees earn somewhat more than those with only one degree while engineers with the doctorate usually earn considerably more than either. The greatest rise in earnings occurs in the first ten years of experience.

Management jobs, as is to be expected, rate high salaries in all major fields. Engineers in sales and research are also above average. Those engineers with their own companies, together with independent consultants, are reported to have the highest incomes of all.

Requirements are high in the consultant field, however, demanding outstanding ability and experience, known integrity and recognized achievement. Some firms handle practically any phase of engineering from original design to redesign for production, manufacturing cost studies, production process engineering, tool designing, plant layout and scheduling. Jobs with these organizations offer excellent opportunities for variety in experience at an excellent salary.

In addition to opportunities in private industry, tool engineers should not overlook the possibilities of positions in government service. In general, most of the same types of titles or production engineers found in a large industrial organization are repeated in the Federal Civil Service. Many of these jobs, of course, are in government-owned and operated manufacturing plants such as ordnance arsenals, navy yards, aircraft factories and the like. Because of the nature of government service, earnings tend to lag somewhat in an expanding

Fig. 4. Growth of research in the United States based on estimates from the Research and Development Board and Steelman Report.



economy. However, there are other advantages such as variety and interest of work, opportunity for rapid advancement and responsibility.

Today, as ever, it is evident opportunity is an individual thing and depends on the initiative, energy and ability of the individual. Tool engineers, however, are in the happy position of being able to create their own opportunities. There is no process so perfect, no production line so efficient and no plant layout so well designed that an alert engineer cannot find ways to better it. This then is both the challenge and opportunity for the tool engineer today.

Gadgets

Ingenious Devices And Ideas To Help
The Tool Engineer In His Daily Work

Grinding Wheel Gage

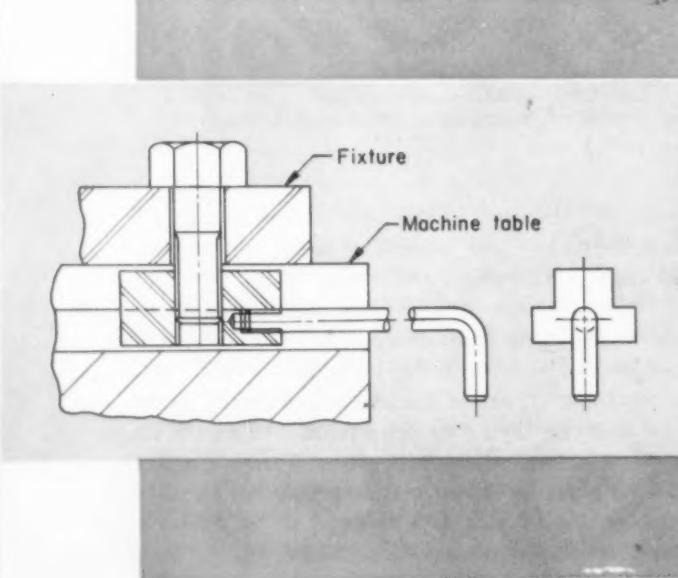
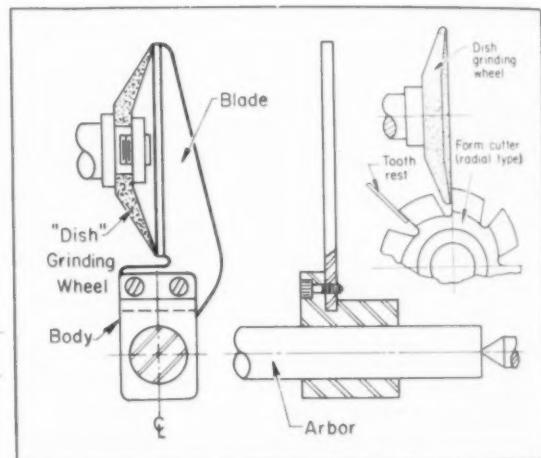
Frequently it is necessary to resharpen form cutters of various kinds so that the face of the tooth is exactly radial. As shown in the setup sketch when the cutter is held on a mandrel between centers, the face of the grinding wheel must align with the face of a cutter tooth, and both must be on the radial line of the cutter. If the cutter grinder is not equipped with a form cutter attachment, it is an easy matter to build this simple gage for setting the wheel to accurate alignment.

The gage is made up of three parts: (1) a blade, hardened to 60 Rockwell C; (2) a soft steel block for the body; and (3) a hardened and ground arbor. The blade is fastened to the body as shown. The body is bored to a snug sliding fit on the arbor, so the body can pivot when the blade touches both edges of wheel and the wheel is on the center line of grinder centers. The center of the bored hole in the body must be aligned exactly with the working edge of the hardened blade. This can best be done by precision grinding of the blade edge after assembly, so it coincides with the vertical center line.

To use this gage, the wheel is first carefully trued, then the arbor is held between centers on head and tailstock of the grinding machine. Cross feed is adjusted until opposite edges of the face

of the dish wheel are in contact with the blade. When this condition has been reached, the wheel face will be exactly on center line with the cutter arbor. Depth of cut is increased by adjusting the tooth rest on the cutter to allow it to rotate its tooth face into the wheel, instead of moving the cross feed of the machine. This method will leave the correct radial setting of the work to the wheel undisturbed.

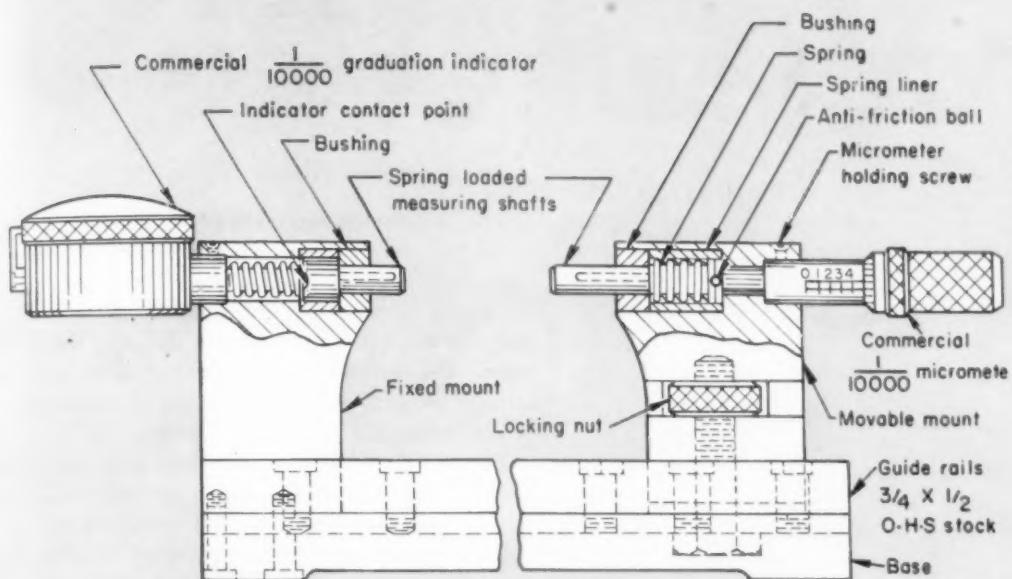
H. J. Gerber
Member-at-Large
Stillwater, Okla.



Special T-Nuts for Fixtures

Where fixtures in a shop are occasionally made with bolt holes instead of slots for fastening them to a machine table, considerable time can be saved by this simple gadget. It consists of a standard T-nut to which a piece of drill rod or heavy wire is fastened with the free end bent to form a handle. By keeping several of these on hand, holding bolts can be quickly engaged with these special nuts without the necessity of fishing them into position in the T-slots of the machine table.

Ernest Egger
Joliet Chapter



Micrometer Gage

To meet the need for low-cost precision gaging equipment the device shown in the accompanying illustration was designed in a small contract firm. Construction is simplified so that practically any jobbing shop should be able to make one.

The base is cold rolled steel, case hardened. A slot is milled through the center to allow a $\frac{3}{8}$ -16 bolt to pass freely. The faces are then ground parallel to the legs. The fixed mount is positioned at one end and fastened in place by four 10-32 socket-head screws. It is further dowelled so that the centerline of the anvil shaft is parallel and square to the base. Guide rails are formed by mounting two pieces of $\frac{3}{4} \times \frac{1}{2}$ -inch oil hardened steel ground stock along the sides of the fixed mount. These guide rails are held in position with 10-32 socket-head screws and dowels.

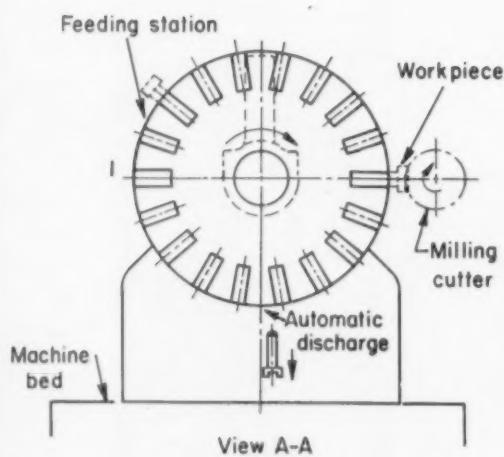
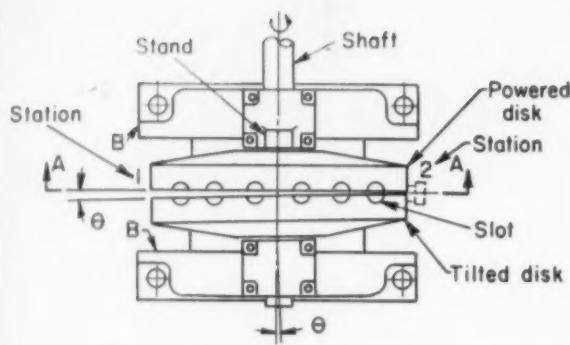
The movable mount slides into position between the guide rails. It must be able to move freely the length of the guideways. The base of the fixed mount should be milled pre-

vious to assembly so that $\frac{1}{16}$ or $\frac{1}{8}$ inch-maximum flats will rest on the face of the base. This facilitates squaring and aligning of measuring faces.

The fixed mount is bored to take the bushing for the measuring shaft and the indicator sleeve. Without disturbing the setup the movable block is inserted in the ways and locked tight. The various diameters for holding the micrometer can then be bored in line with the mounting hole bored in the fixed mount. After this operation is completed, final assembly of all parts is made as shown in the illustration.

If even greater accuracy is desired a further refinement of this device can be made by substituting an air gage, calibrated in 0.000050 inch, for the 0.0001 indicator. With this arrangement remote reading and fine measurements can be obtained.

*Thomas J. Bizzoco
Greater New York Chapter*



If you know of a short cut, unusual machine setup or tool or die design that would help other tool engineers submit it to the Gadgets department. You will be advancing the tool engineering profession and will receive an honorarium for your idea upon publication.

Automatic Milling Fixture

Volume production of slotted bolts and similar parts can be obtained with this milling fixture. Clamping, unclamping and discharge of parts are automatic. Production is continuous since feeding and unloading are done without stopping the operation. The mechanism of the fixture is simple and reliable for parts having sufficiently close tolerances to assure clamping at the work station.

The principal elements are two disks provided with grooves to hold the parts to be machined. One of these disks is keyed to a shaft connected with the milling machine or otherwise powered to rotate the fixture. Movement of the fixture and workpiece past the milling cutter is regulated to give the desired cutting feed.

Clamping and unclamping action is secured by setting the two disk faces at an angle to each other. This angle, θ , will vary somewhat, depending on the diameter of the disks but it will be small—between $\frac{1}{4}$ to 1 degree. Of course, the axis of rotation of the disk will be tilted at the same angle with respect to the axis of the powered disk, which is the centerline of the shaft.

Due to the angularity of the axes of rotation of the disks, the gap between them at stations 1 and 2 are at a maximum and minimum, respectively. Loading the workpieces in the fixture is performed at station one. A positive locating device should be provided on the vertical stand, shown in dotted lines in cross section, to assure proper positioning of the workpiece before it is tightly clamped. Because of the design, the clamping action will occur after the loaded bolt goes past the vertical and approaches the cutter. The bolt is firmly held as it is rotated through the milling cut. After the slot is cut, the bolt is gradually unclamped as it leaves the operating zone, until it drops out of the fixture at the bottom position.

The design affords considerable flexibility in types of operations and size and shapes of parts to which it can be adapted.

*Akshay P. Dutt Choudhury
Philadelphia Chapter*

Precision Production of Small Parts

By Henry De Coursey*

Tool Engineer
Friden Calculating Machine Co., Inc.
San Leandro, Calif.

MANY PRECISION PARTS must be produced on a high volume basis to meet manufacturing schedules. Wherever press operations are possible, they offer a proved means of meeting requirements at an economic cost, especially if the setup can be made automatic or semiautomatic, as in *Fig. 1*. Progressive dies are well adapted to this purpose for small parts such as those used in the instrument field.

A practical application of these considerations is found in the manufacture of components for automatic calculators. Processes are especially critical for moving parts, such as the transfer cam, *Fig. 2*, which is a component part of an important subassembly.

The setup, *Fig. 1*, for production of the transfer cam employs an automatic punch press, precision die set and feed rolls. The press has a capacity of 45 tons and a range of 100 to 300 strokes per minute. Material for the part is $0.050 \times \frac{5}{8}$ inch wide bright punching steel, which is drawn through the feed rolls, cleaner and oiler, from a motorized combination stock straightener and coil cradle. This unit maintains a stock loop between the cradle and the feed rolls. As the loop is shortened in feeding the stock through the press, limit switch contacts are closed, causing the motor of the coil cradle to extend the loop as required.

To start a press run, the stock is "inched" through the stripper to the first finger stop of the die, *Fig. 2*. On the first press stroke, the pilot hole is pierced near the edge of the stock. The stock is

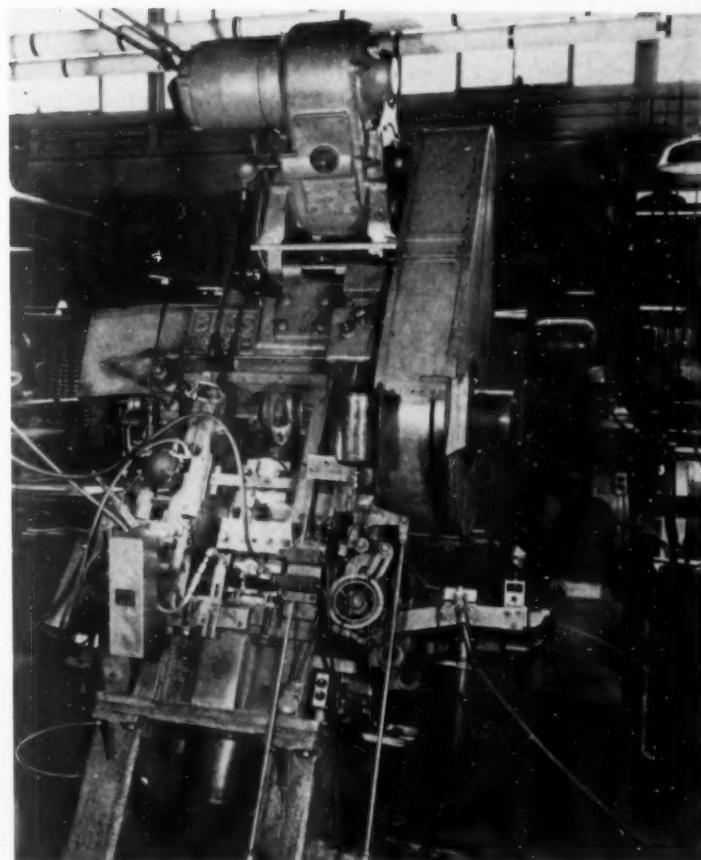


Fig. 1. Press setup for production of a transfer cam used in automatic calculator.

then inched to the second finger stop, an idle station containing a pilot. Upon completion of another press stroke the stock is advanced manually to the third finger stop. This press stroke shears the part oversize for subsequent peripheral shaving. However, as shown in *Fig. 2*, the part is not completely separated from the strip. It is held in the material strip to facilitate subsequent die operations. After this step the material is advanced to the fourth finger stop, another idle station containing a pilot. Upon completion of the press stroke,

*Senior member ASTE Golden Gate chapter.

the stock is advanced to the last station of the die.

In automatic press operation the transfer cam is completed by piercing, shearing, extruding and shaving in the last station and marked by a die identification. At the finish of the press cycle at the last die station, the part is expelled from the die by a shedder and blown to a tote pan at the rear of the press by an air blast timed by the crank-shaft.

The die for this operation is classed as a progressive, pierce, blank (shear), shave and extrude die. At the first station, the pilot hole pierce punch is located in the lower shoe. The slug from the pilot hole pierce punch is pushed up through the die and blown out through an inclined passageway by an airblast, which operates continuously to clear the die. For precision relation between the center hole, the extrusion and the periphery, the part must be shaved. When a part is shaved the developed shaving is retained by the scrap material strip to contribute to long die life and minimum maintenance. To fabricate the precision die, both punch and die were ground on a form grinder to a carefully laid out 20 to 1 master.

For protection of die, operator and press, electronic and mechanical safety devices are employed.

An automatic stop switch, which will halt the press when the stock bows more than a predetermined amount between feed roll and the first guide of the stripper, protects the die. The press will not start another cycle if a severe load is imposed. Compensation for variation of stock width is accomplished by leaf spring actuated stock pushers. Operator safety is obtained by twin photoelectric eyes. When either one or both projected beams are interrupted, the press will not start another cycle. If the light beam is interrupted while the press is running it will stop on completion of the stroke.

Fast accumulation of stock scrap is controlled by a stock scrap chopper which operates at each cycle and reduces scrap to small pieces. The punch press department is requested by means of a route card to indicate the die number of each run. If a run cannot be completed with a particular die, the lots are separated as one of many steps necessary for quality control.

After the presswork, the next operation is degreasing. In addition to degreasing, slugs and foreign material are separated and removed from the lot. The part then is hardened to improve the working areas of the cam. A carbon case from 0.009 to 0.011 inch is imparted to the entire surface. After quenching in a light oil the case must test 52-58 R_c under a 15-kg load.

One of the finishing steps is a tumbling process using dry sand. The purpose of this is to remove any residue adhering to the surface as a result of heat treating. After this, the lot is submerged and tumbled in a sodium-cyanide solution to remove any remaining deposits that may have become imbedded in the extrusion pocket. This operation also mildly etches the entire surface of the part.

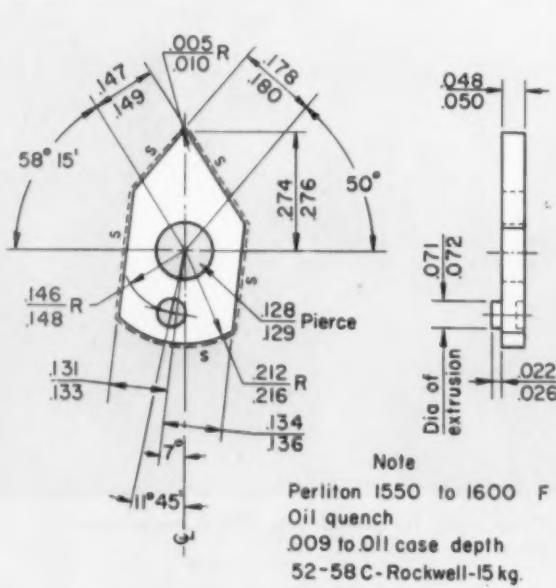
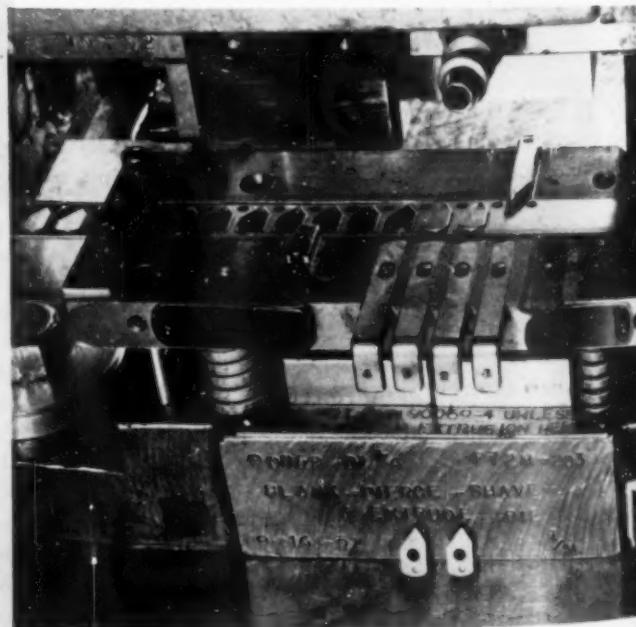


Fig. 2. Transfer cam design drawing. Part, used on accumulator dial shaft assembly, is 0.050 x $\frac{5}{8}$ inch BPS stock.

Fig. 3. Progressive die for production of transfer cam. Parts are shown in stations before separation from stock.



leadscrew pilot

for Acme tapping

By Ernest H. Romine*

President
Horspool & Romine Mfg. Co., Inc.
Oakland, Calif.

ALTHOUGH HYDRAULIC and air cylinders are used extensively for reciprocal motion, the Acme screw thread is still applied in the manufacture of lathes, milling machines, planers and other machine tools. Factors limiting use of Acme thread and nut assemblies have been the high cost of tapping nuts with this thread form and the unavailability of standard tools. Many manufacturers have used a standard 60-deg thread form because of the added cost of an Acme with its 29-deg included angle. Lack of suitable standards on Acme thread tolerances has also handicapped general use of this thread form because of difficulty in obtaining interchangeability. An eight-year development program, however, has resulted in production of a single-pass Acme tap that can be easily applied, *Fig. 1*.

The general practice of tap manufacturers to put the Acme tap in the "Special" category has kept the cost high and extended delivery time. Tap design has been conservative and multiple tapping has been the rule in most Acme work. This has led to the use of expensive leadscrew operated tapping equipment to avoid reaming and requires skilled operators for satisfactory results. Losses from scrap and tap breakage have kept many designers and manufacturers from using this thread form.

*Senior member ASTE Golden Gate chapter.



Fig. 1. Chips are flushed from the leadscrew pilot tap by forcing coolant through the drilled hole. Flutes are extended along the shank so chips can pass through even at end of cut. Workpiece is a 4140 steel forging, heat treated to a hardness of 35C Rockwell.

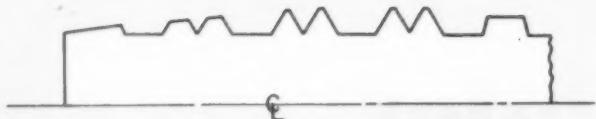


Fig. 2. Pilot end of the single-pass Acme tap has leadscrew cutting teeth to draw the heavy Acme teeth through the workpiece.

An analytical study of the design and use of Acme taps resulted in a list of desirable qualities for such tools. An ideal tap would: form a thread in a single pass, reduce machining time, reduce scrap, be easily used by unskilled labor and be practical as a stock item. Factors limiting tap design were: loading of flutes with chips which would lead to tap breakage and the high torque developed under full engagement which would overload and break the shank. To meet a specific production need, it was decided to initiate a project into design of Acme taps. It soon became apparent that the customary methods could be improved upon.

First step in the project was an attempt to tap an Acme thread in a cast iron handwheel. The required Acme was 3 inches long, $\frac{7}{8}$ inch in diameter

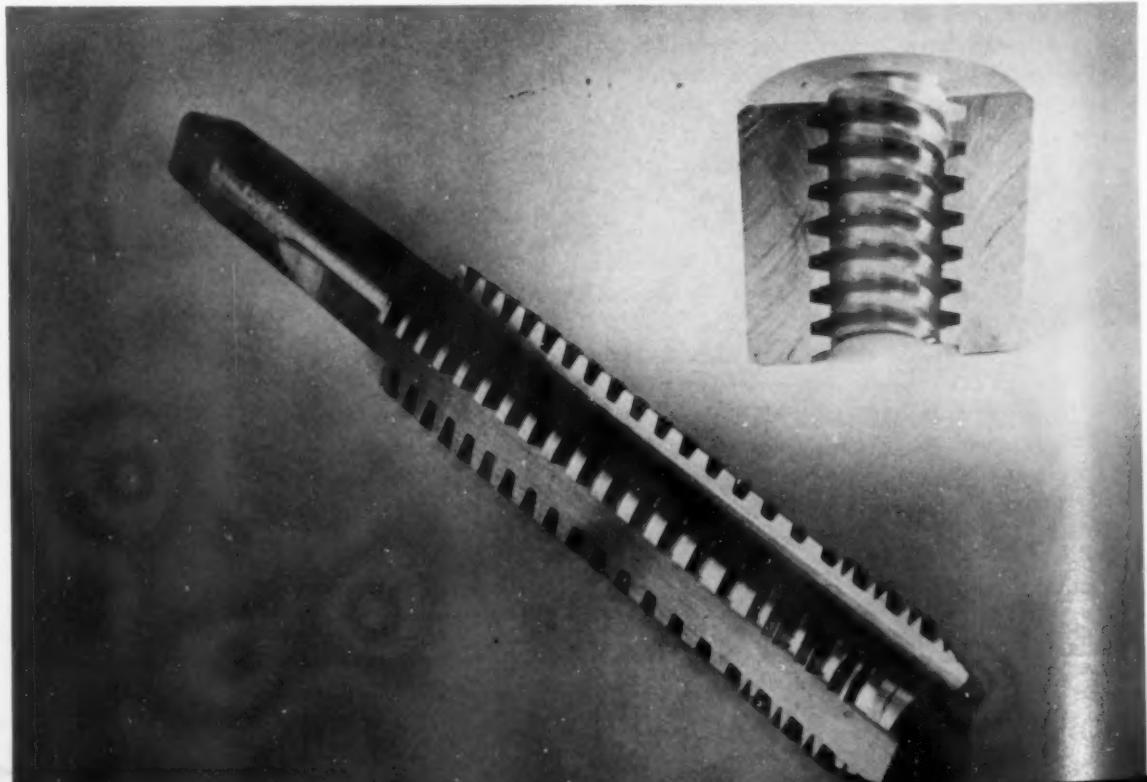
Fig. 3. Multiple start Acme tap with leadscrew pilot. Aluminum nut was threaded with a cut per tooth of 0.007 inch.

and had 3 threads per inch. A 15-inch conventional tap with an effective cutting length of 9 inches was tried with a single pass. Since the operator depended on "feel" to establish the lead, this tap would sometimes ream the hole.

To reduce tapping time, the second tap designed was shorter and cut per tooth was increased from 0.0015 to 0.0025 inch. This tap was satisfactory except that some difficulty was still experienced with reaming. At this time, the idea of incorporating a leadscrew pilot on the tap was tried. This tap had an effective cutting length of 5 inches, a depth of cut per tooth of just over 0.003 inch and fine teeth cut in the pilot. These teeth acted as a leadscrew and drew the following Acme form portion of the tap through the work uniformly. This design performed satisfactorily for a year and a half.

In the next design, the leadscrew pilot thread form was changed so that the full cut on the thread form was left for the following teeth. This prevented a slight shaving of the starting threads that had been experienced with the previous design. This tap cut a $1\frac{1}{2}$ -diam Acme of 4 threads per inch with a cut of 0.004 inch per tooth. It has been used for steel, brass and bronze nuts up to 3 inches in length. The increased chip load per tooth did not increase the loading of the flutes, as might have been suspected, because the heavier chips were not as bulky as those produced by light cuts.

Based on experience to this point, it became apparent that the leadscrew pilot, Fig. 2, was the key to improved Acme tapping. Leadscrew thread form was investigated to establish a design that would give maximum life, easy starting and sufficient



strength for starting the heavy Acme form teeth. Pilot threads are now made as close to Unified form as practical. In the larger sizes, it is necessary to use a 45-deg included angle to maintain the proper proportions between depth required and width of tooth. These proportions have been maintained in the standard Acme single-pass tap designs that have been adopted. This feature of the design is not limited to Acme threads since it can be helpful in starting any tap, regardless of thread form, that removes a large quantity of material.

This same principle has been tested on external threading and excellent results have been obtained. With a self-feeding diehead, the force required to start the threading action is reduced and starting threads have better form. Dieheads of this type could improve the quality of the first two or three threads so that present allowances of two or three imperfect threads would be unnecessary. With the additional threaded strength thus produced, considerable savings could be made by using shorter thread engagement.

The first attempt at multiple-start threads with a leadscrew pilot was for a 1-inch diam, 4-thread per inch, $\frac{1}{2}$ -inch lead thread in aluminum. Initially, two taps were used to experiment with this coarse lead but the taps cut so freely that when a similar requirement occurred, a single pass tap was used. The latter tap, Fig. 3, cut 0.007 inch per tooth and produced a satisfactory thread. The tap, for a 3-inch threaded section, was 9 inches long with an effective cutting length of 4 inches.

It was thought that three taps would be needed to remove the large amount of stock required to make $2\frac{1}{4}$ -inch diam Meehanite nuts that were 9 inches long. Each tap was $4\frac{1}{2}$ inches long and depth of cut per tooth was 0.0033 inch. Only the first tap, Fig. 4, required a leadscrew pilot. The problem of chips clogging the flutes and stalling the tap was overcome by applying a coolant under pressure to the open end of the drilled hole. A four-flute design was selected to gain chip room and this configuration was used on all subsequent taps. Production results with this set of taps indicated the job could have been done equally well with two taps or possibly with one single-pass tap.

It is believed that the leadscrew pilot is primarily responsible for the success achieved by increasing the cut per tooth. This results because the pilot centers the heavier cutting section of the tap accurately in the drilled hole and prevents crowding of the following teeth to distribute the cut evenly and uniformly during the critical time when the heavy cuts are starting in the work. The leadscrew pilot also insures a starting thread without shaving or distortion.

Manufacturing costs of taps with leadscrew pilots are slightly higher than those for conventional taps

because of the special thread form. This necessitates another setup on the thread grinder and several additional passes to bring the thread to the required shape. This thread form must not interfere with the following Acme form teeth or imperfect starting threads may be caused by shaving.

The life and value of any tap is gaged to some extent by the amount that it can be resharpened. The single-pass Acme tap can be resharpened in two ways—on the flutes and on the chamfered starting threads. These taps have full radial clearances and, although the pitch diameter is reduced in resharpening on the flutes, the tap will never cut out of tolerance for a Class 2G fit. Resharpening of the starting threads on the pilot is done in the same manner as any standard tap, and the amount of wear and frequency of sharpening are comparable.

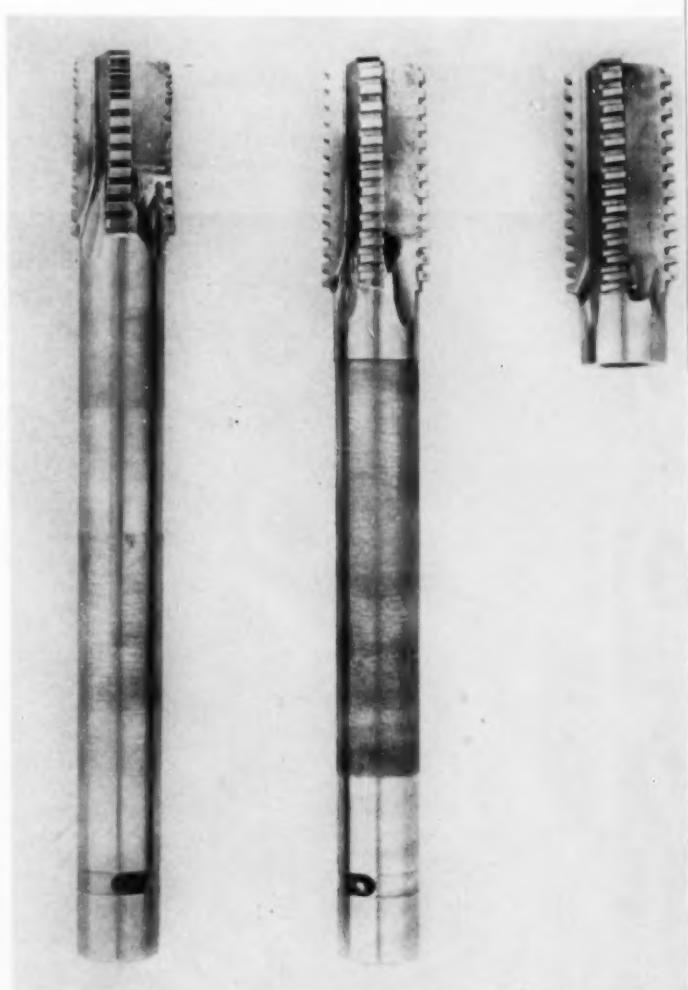


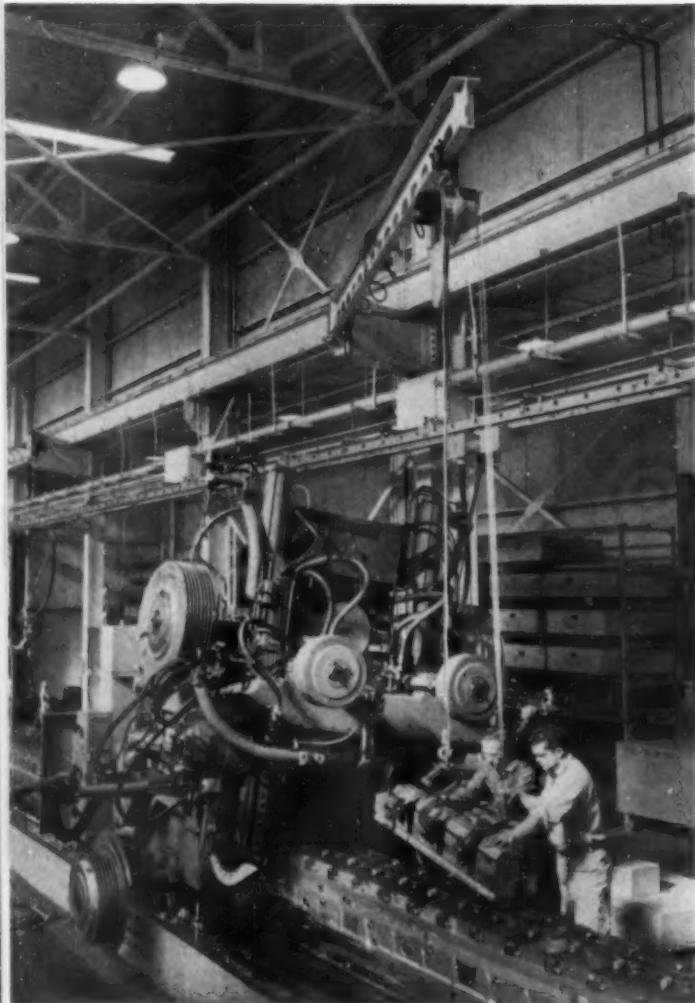
Fig. 4. Set of three taps used to thread a Meehanite nut 9 inches long and $2\frac{1}{4}$ inches in diameter. Only the first tap, at left, has a leadscrew pilot. The third tap is shown detached from the alloy steel shank that was used to conserve high-speed steel and reduce hardening costs.

designed for **PRODUCTION**

Long Milling Machine Controlled by Helical Cams

By C. F. Wallace*

**Project Tooling Engineer
Douglas Aircraft Co., Inc.
El Segundo, Calif.**



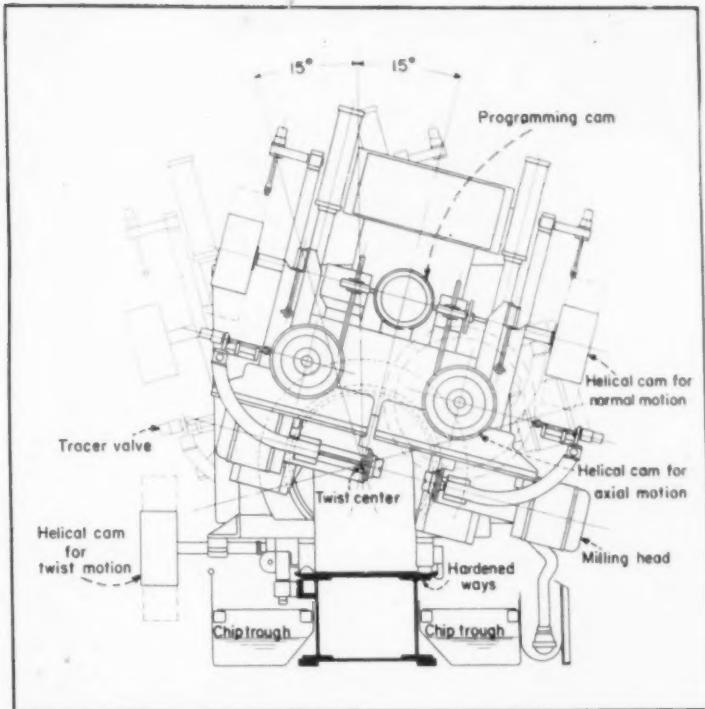
Eight milling head carriages have been mounted on a bed 308 feet long to produce integrally stiffened spars. This machine is the equivalent of eight spar mills, each as long as but not longer than required. Each of the carriages on this Farnham mill has either five or six helical control cams. Six are required for those carriages that twist.

A number of identical or dissimilar parts can be mounted end-to end on the bed and machined in rapid succession. An overhead crane can pick up any carriage and leapfrog it into a new position on the bed. When plugged into the power supply and tooled, the carriage is ready to operate.

*Senior member ASTE Los Angeles chapter.

TWIST CARRIAGES are identical to straight carriages except that they can be tilted 15 deg each side of vertical. Patented helical cams are used to control the carriages. The cam is composed of developed $\frac{1}{8}$ inch thick aluminum fins permanently mounted on aluminum alloy drums. These packaged templates ride the carriage and are geared to its movement. Hydraulic tracers are in constant contact with the cams. When not in use, templates are stored in identified boxes adjacent to the machine. The specially designed universal sub-base will take any type of work fixture and hold it securely during milling. Made up of 4-foot units with individual hydraulic clamping valves, compounded lengths can be actuated by one lever. Each clamp is valve controlled so the carriage can trip it, permitting use of flying clamps. The workholder was top surfaced by one of the carriages during assembly to assure parallelism with the ways.

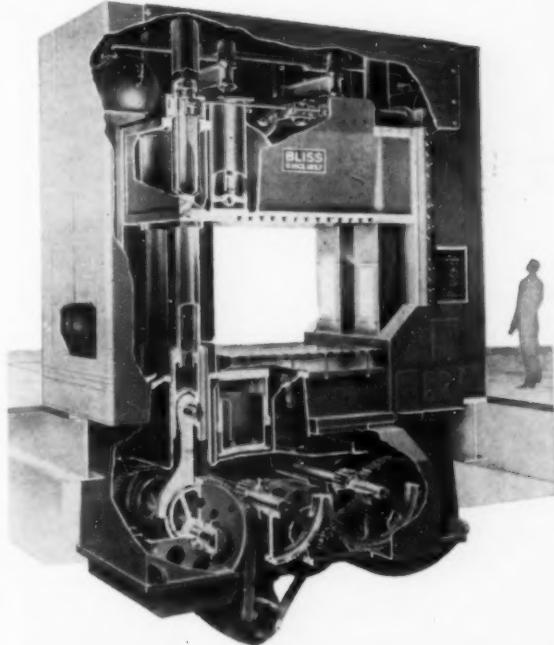
RIGHT AND LEFT HAND integral cutters are used on each spindle because 80 percent of the parts are milled both forward and reverse. On the reverse cut, the spindle is reversed and the horizontal control cam moves the spindle so the correct cutter contacts the work. Each cam is assembled so that, on the extreme travel of the carriage, the grooved cam follower runs past a switch much like a railroad track switch. On the reverse cut, the cam follower rolls over a different cam. This second cam is assembled between the segments of the forward cam, making a double helix.



Press Line Redesigned for Modern Production

As industry has moved toward mechanization, the basic press has seen only minor improvements. Lights, controls and automatic equipment have been hung on presses to the point where safety and efficiency were both impaired. The E. W. Bliss Co., Canton, Ohio, with the cooperation of engineers from the automotive and appliance industries, decided to redesign a line of presses that would reflect the needs of automatic production. These modern machine tools conform to Joint Industry Conference (JIC) bolster, bed, die and slide area specifications, and to blankholder and plunger dimensions.

In these "packaged" presses, the wiring, piping and controls are built into the frame. All the presses in this line have heavy frame, automatic recirculating oil systems, manual and motorized plunger and blankholder adjustments, high-speed air or electric clutches, and front-to-back shafts. The clean, uncluttered exterior leads to safety, and easy attachment of automatic feeding and unloading division.



FOUR-POINT SINGLE-ACTION underdrive press designed and built to reflect progress in the mechanization of production. Wiring, lighting, piping and controls are built into the frame and enclosed. Power and air-line takeoffs are also built into the columns. With the drive mechanism beneath the press and counterbalances in the slide instead of the crown, over-all height of the press is reduced. Less headroom is required in the plant for crane operation with a press of this design. Also, maintenance and repair are on a lower level and separated from production line activity. Enclosed side posts prevent dirt and scrap from reaching the drive box.

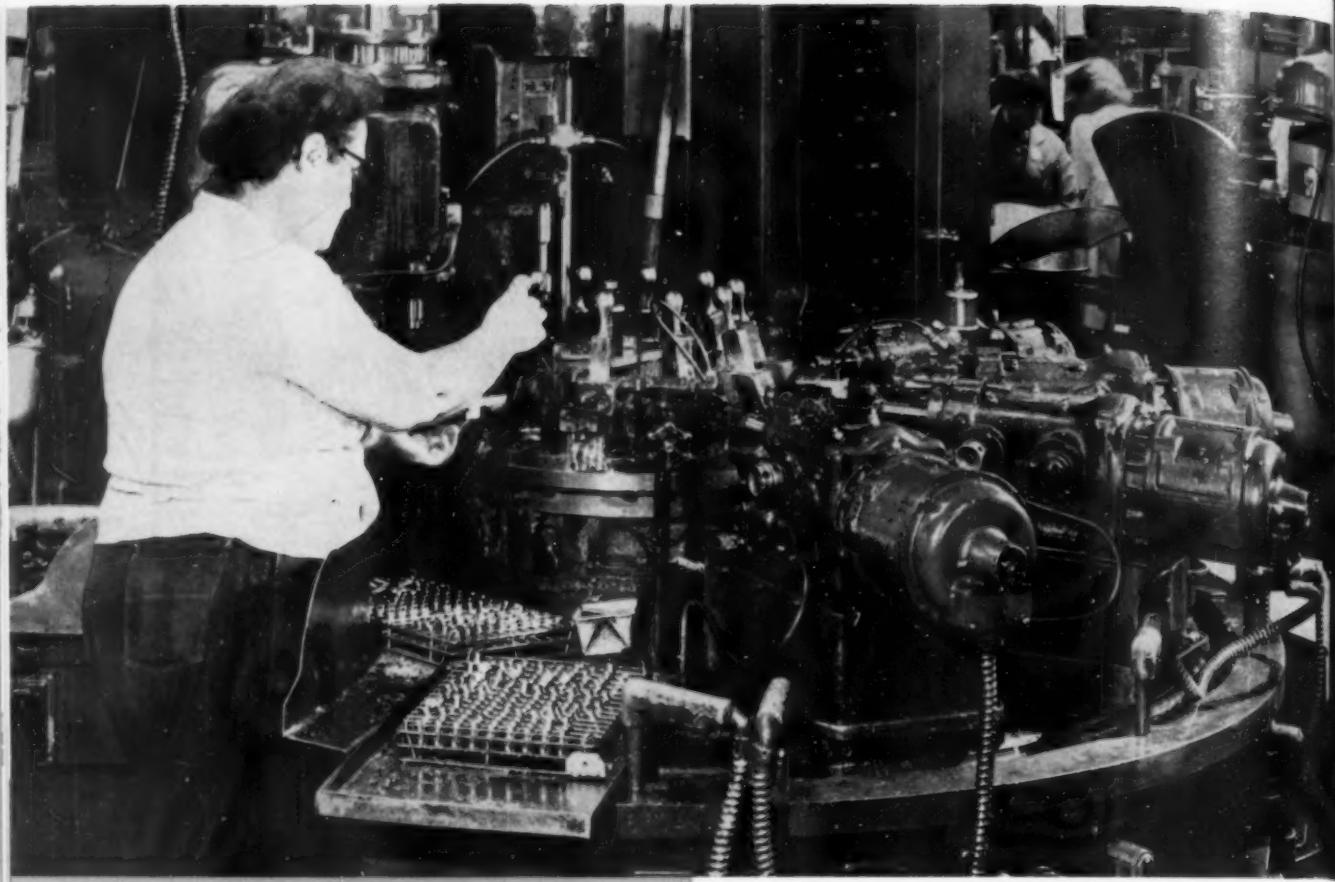


Fig. 1. Special machine made of standard drilling heads for producing tumbler holes in cylinder plugs.

TOOLING for door locks

By Louis A. Talamini*

Product and Tool Engineer
Schlage Lock Co.
San Francisco, Calif.

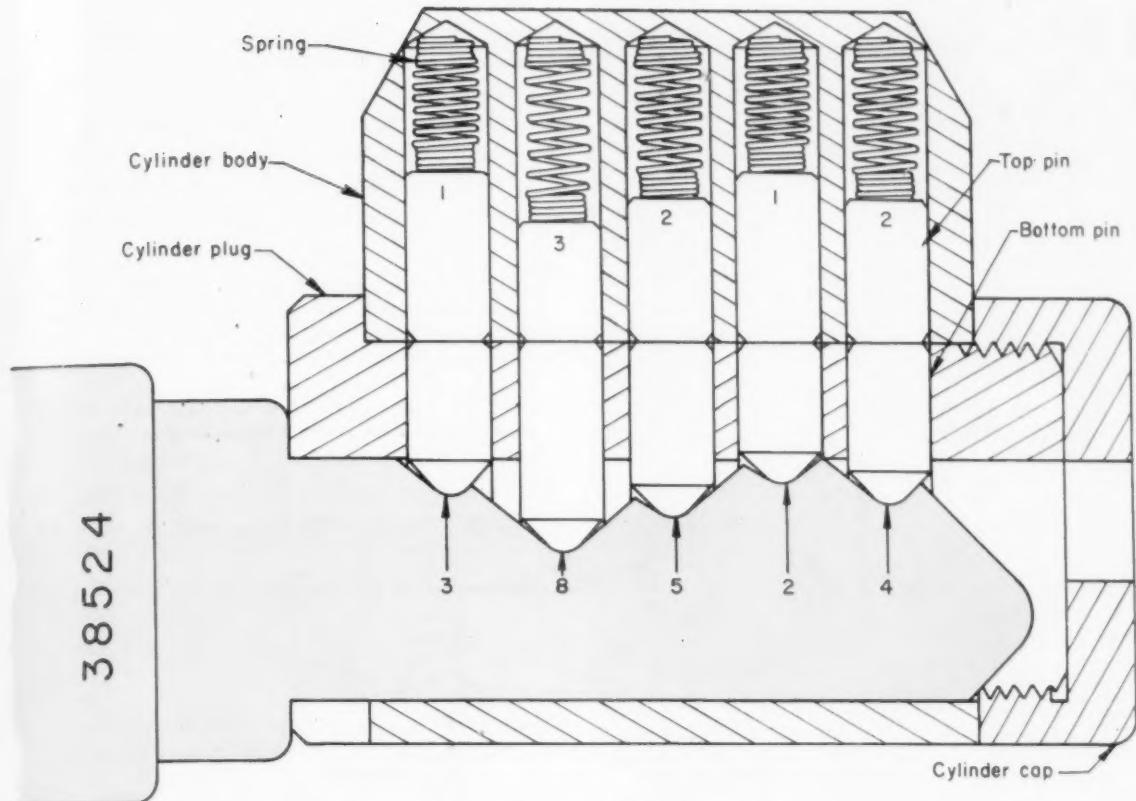
*Senior member ASTE Golden Gate chapter.

INCENUITY and proper application of tooling and design techniques are required in the production of quality cylindrical locks. Dimensions must be precisely controlled, production schedules must be met and tooling must be arranged to minimize operator fatigue.

To reduce manufacturing and handling costs, considerable time and effort have been expended on the design of automatic fixtures. Air clamping is used wherever applicable. Selection of automatic machinery, Fig. 1, has been with the view of attaining maximum advantages from automatic fixtures.

All departments have roving inspectors so that product quality can be maintained at satisfactory levels at the point of production. These inspectors have authority to stop any machine or operation that is not producing within limits.

Heart of a cylindrical lock is the cylinder unit, Fig. 2, which comprises the cylinder plug, body and cap, and the pin tumblers. The screw machine blank for the cylinder plug is produced on an Acme 6-spindle Ra-6 9/16 automatic screw machine.



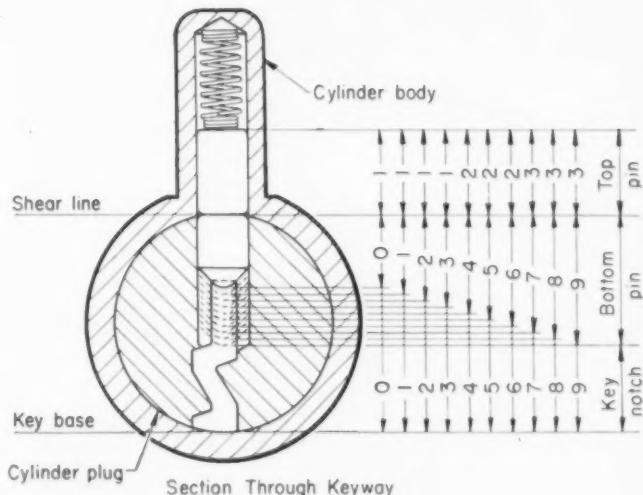
Section Through Cylinder Unit

Fig. 2. Section through cylinder unit with change key in place. When pins line up, lock can be actuated. Possible combinations of variables are shown at right.

Tooling and operations for this part are conventional. Fine finish is achieved on the plug with a carbide-tipped shaving tool. Threads at the back of the plug are rolled and, because the body diameter is small (about 0.504 inch), a double thread roll with a diameter double the body size is used.

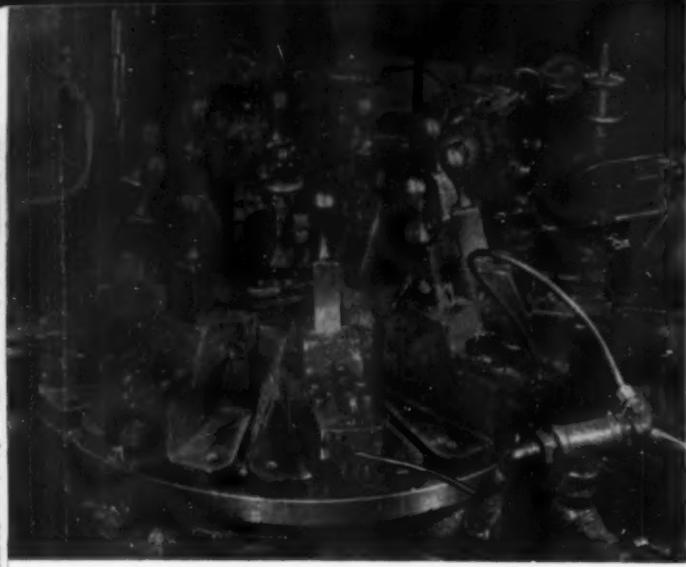
To protect the finished surfaces on the plugs, they are handled in racks with individual compartments. Pin tumbler holes are drilled on a 10-station single-purpose machine, *Fig. 1*. This machine is made up of standard drilling heads and special jigs, and can be used to produce either five or six-pin plugs.

Plugs are loaded into fixtures from the bottom with the plug flange down and clamped to the fixture, *Fig. 3*. A small pinhole, for securing the cylinder cap, is drilled in two stations because of its depth. The 90-deg countersink that guides the key during insertion is drilled upward. Indexing of this special machine is power operated but manually controlled so there will be no empty fixtures in the machine. When a finished part is in the unload station, a cam in back of the drill jig releases the clamp and allows the plug to fall into the operator's hand.



Cylindrical lock keyway contours, *Fig. 4*, must be produced to close limits to insure free operation of the key in the lock. These keyways are broached three at a time on a double ram machine, *Fig. 5*. Each keyway is broached by a set of six broaches with a total length of 48 inches. Tools are designed for stock removal rates of 0.0035 inch per tooth, with the exception of the last ten teeth. Six of these remove only 0.001 inch per tooth and the last four burnish the broached surface.

Three workholding fixtures are mounted on a

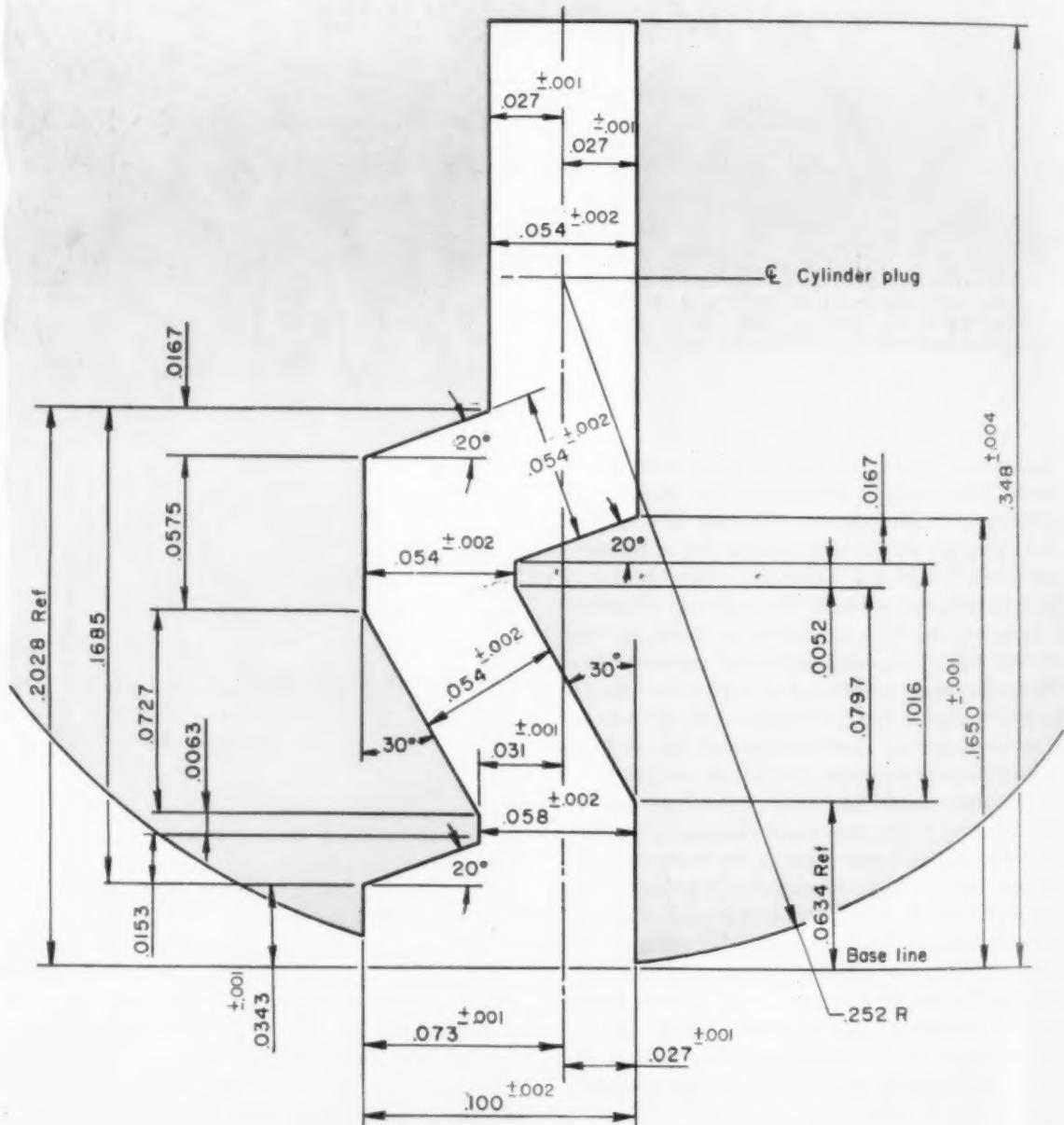


common base, *Fig. 6*, but each fixture has an independent, knurled micrometer side adjusting screw, as well as an eccentric cam screw for forward or backward adjustment. These individual adjustments are important to compensate for variations in tool resharpening.

Each cylinder plug is located in one of the broaching fixtures by a pin, *Fig. 7*. The pin is

Fig. 3. (left) Drill jigs on machine for making tumbler holes in cylinder plugs. Handle on each jig locks part in position and the cam in the center releases the clamp at end of each complete cycle.

Fig. 4. (below) Keyway contour with dimensions that must be maintained by broaching.



actuated by movement of the clamp. Should the plug be out of position, the locating pin retracts against its spring to prevent breakage of the locator. The three plugs are simultaneously clamped by moving the clamp bar. While one set of fixtures moves under one broach ram, the other set withdraws for unloading.

To set broaches after sharpening, the ram is depressed until the last tooth is level with the top of the fixture. A previously inspected broached part is dropped over the broach and into the fixture. Necessary adjustments in fixture position are then made.

Cylinder bodies are produced on a six-spindle automatic screw machine with conventional tooling. The five pin-tumbler holes are drilled in the body on an eight-station machine made up of standard drilling heads. Holes for the pins are drilled through the lower wall of the cylinder body. To prevent pins from falling out, these holes are plugged in a die

that pierces slugs and wedges them in position in the holes at the same time. The hole for the cylinder plug is then reamed.

Door locks manufactured in this way offer ease of operation and many combinations. A five-pin lock has 100,000 possible pin-length combinations. By altering the shape of the keyway, endless combinations are possible.

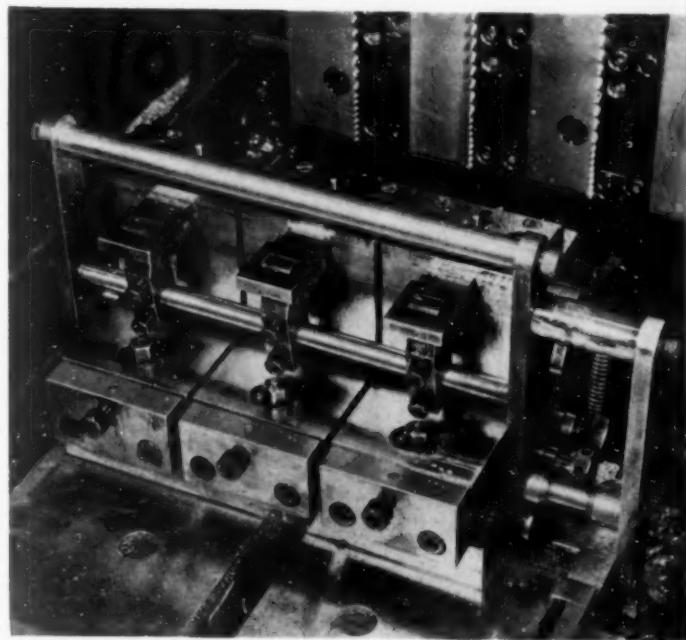


Fig. 5. (below) Twin ram broaching machine used to form keyways. Fixtures at left are ready for loading, those at right ready to be retracted and unloaded.

Fig. 6. (right) Three broaching fixtures are mounted on the machine table. The horizontal bar handle simultaneously actuates locking clamps for all three fixtures.

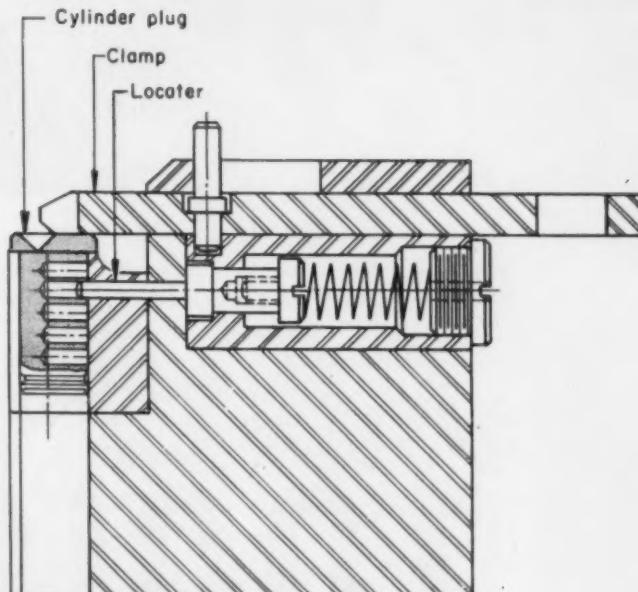
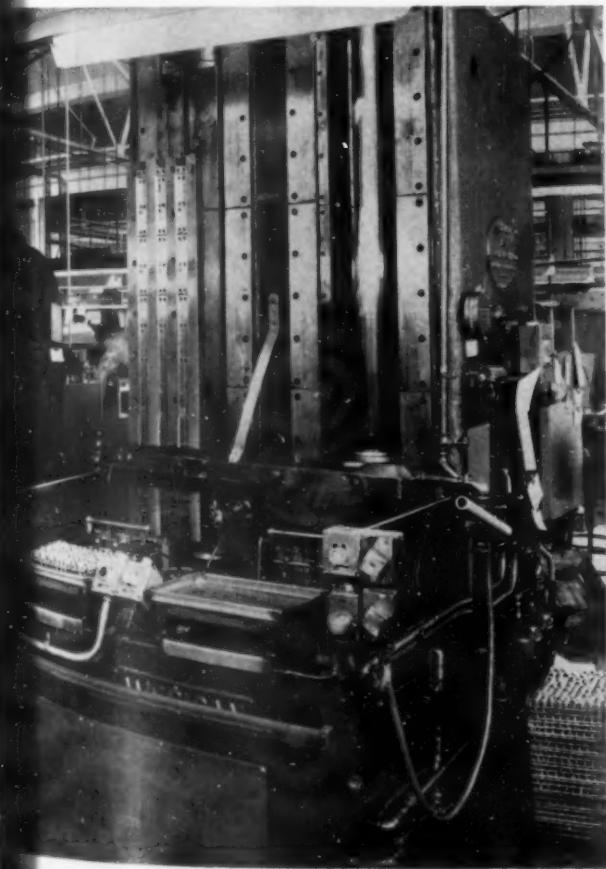
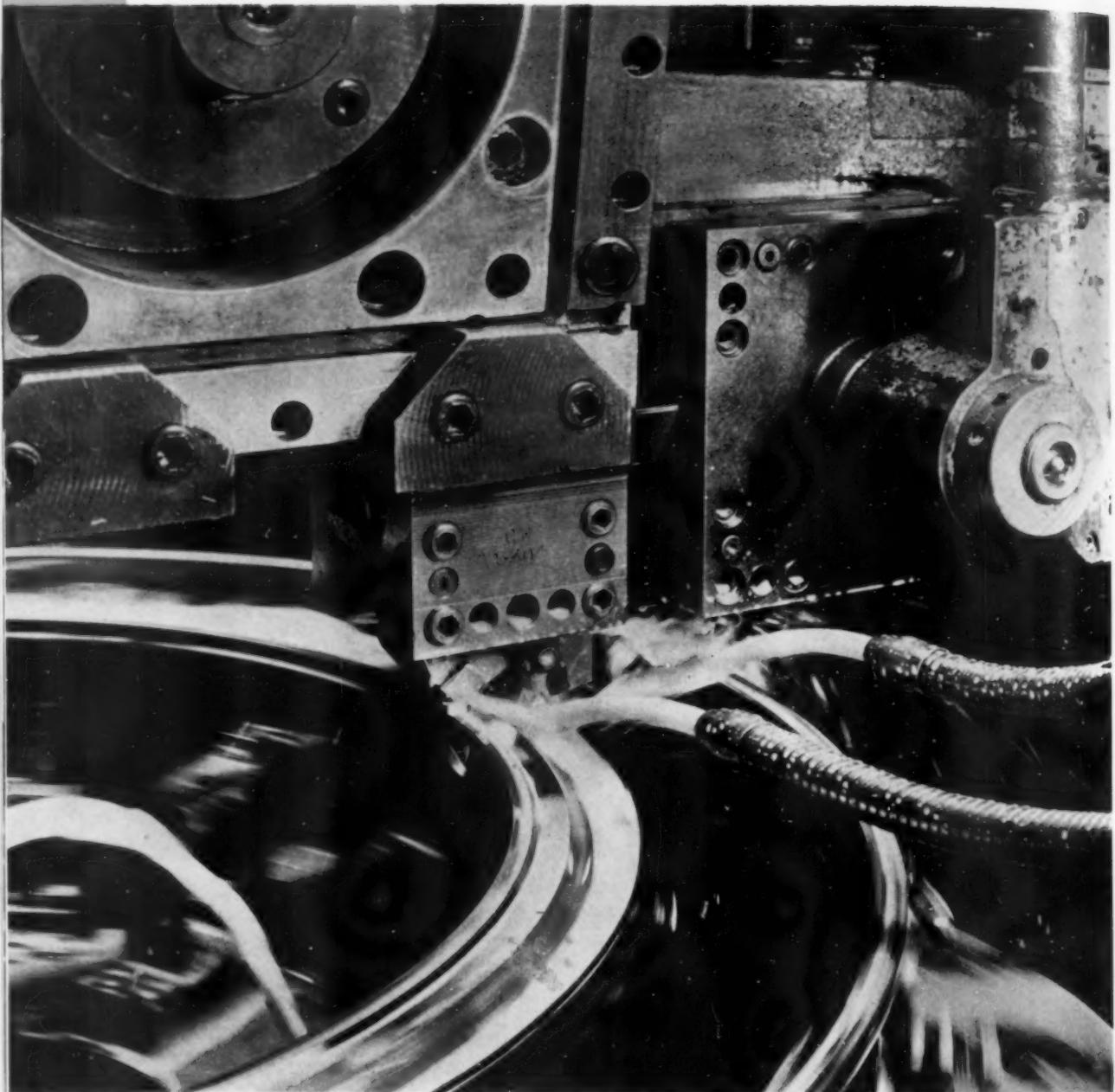


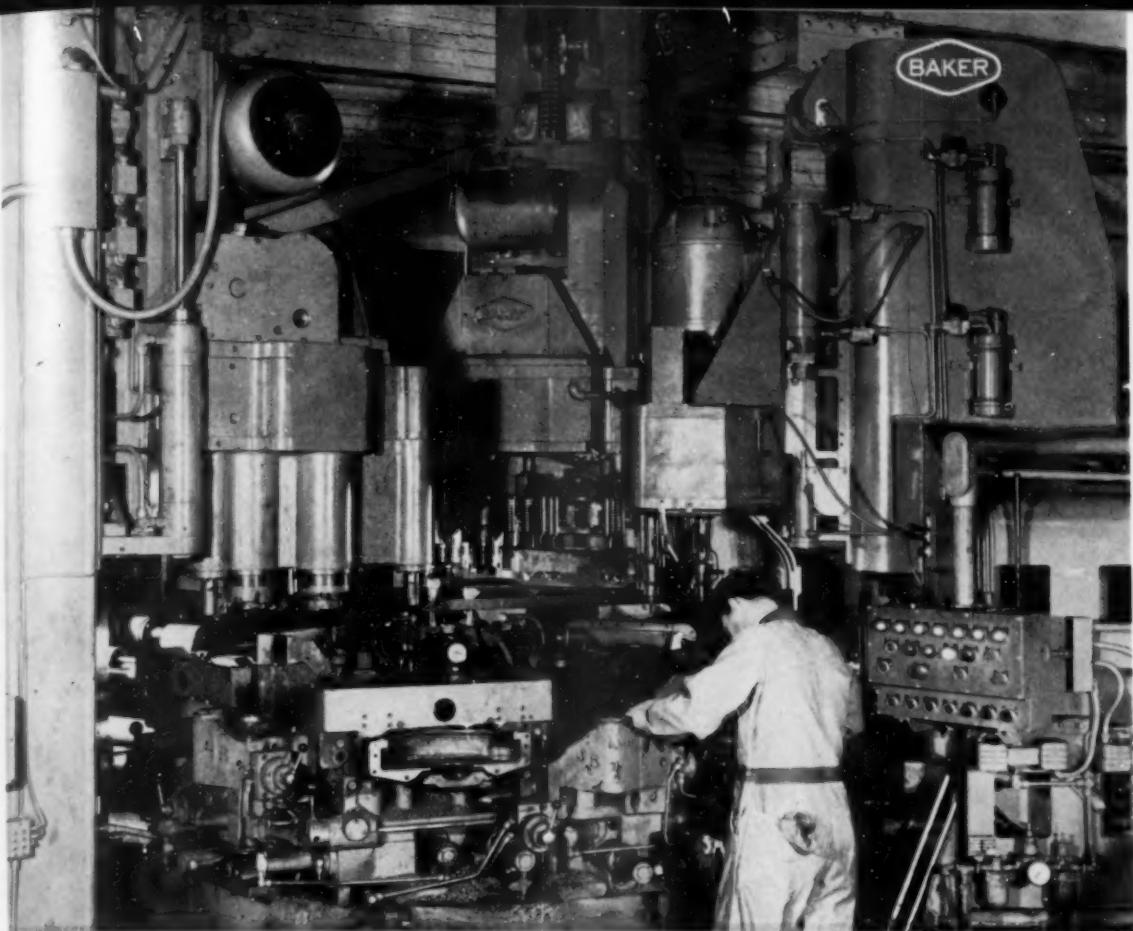
Fig. 7. Spring-loaded locating pins insure proper positioning of parts in broaching fixture.



JET ENGINE compressor frame production was boosted when tool engineers at Thompson Products, Inc., Cleveland, found the right setup for machining the 310 stainless. Work hardening was the major problem complicated by weld spots and interruptions on the outside of the rim. Danger of distortion of the delicate

workpiece limited feed to 0.008 inch. Shifting the rough and finish facing operation to a Bullard vertical turret lathe and converting to Carboloy grade 370 carbide insert tools increased output from 3 to 14 pieces per shift. A 0.1000-inch cut is used at 36 rpm or 340 surface feet per minute.

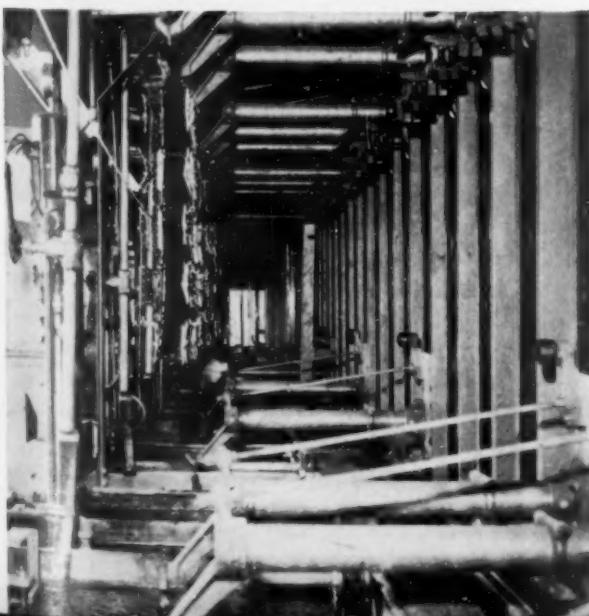
TOOLS at work



FINISH OPERATIONS on a rough flywheel housing cover at Studebaker-Packard Corp. are automated by this special-purpose machine. A total of seven vertical and horizontal boring and drilling units are

disposed around a 72-inch diameter, five-station automatic index table. These units contain a total of 37 spindles for all holes needed in sides and top of the cover of the Baker Brothers machine.

AUTOMATIC CHROME PLATING of zinc die cast refrigerator hardware in a two-hour cycle at National Lock Co., Rockford, Ill. involves 27 immersions. Underplatings of copper and nickel are applied first. After plating, parts are automatically transferred to a conveyor to be rinsed and dried.



SPECIAL TRUNNION fixture simplifies radial drilling operations at De Laval Steam Turbine Co., Trenton, N. J. A pump cover mounted in the fixture is located by the face into which drilling is to be performed. The worm-gear driven index mechanism on right side of fixture permits drilling work in various planes in a single setup. With the addition of an index plate to the jig plate, any desired compound angle can be obtained.

Fig. 1. Salvaging a worn die by welding. Advantages of quickly returning a die to production in an emergency are sometimes more important than the savings in die cost.



welding repair

prevents costly shutdown

By William G. Burge*

**President
Toolnu Processing Inc.
Oakland, Calif.**

MANY PAST ATTEMPTS to repair dies by welding have failed to give desired results because the technique and skill needed for such a job were not adequately developed. After a few unsatisfactory attempts, salvage was usually given up as a hopeless task.

Any general description of repair work is difficult due to the individual characteristics inherent in each job. However, this article will outline in brief some typical jobs to indicate the factors involved in repair work such as illustrated in Fig. 1. The jobs used as examples do not necessarily represent the best possible solutions to the problems. The repair work in each case, however, proved practical and inexpensive and gave entirely satisfactory service.

Recently, for example, a blanking die fractured

and caused a complete block in production. Faced with an emergency, shop management decided that the die was worth repairing from a standpoint of practicability and economy. The die was analyzed and found to be oil hard, about 1 inch thick with the shape shown in Fig. 2.

Confronted with the usual problem of making the repair on a use-hardened die with a minimum of warping and with no annealing, technicians treated the surface with a die penetrant (Dy-Check) and noted all small surface cracks. This enabled the welder to decide exactly where and how the deposition would be made. Also, he could anticipate the effects of subsequent stresses throughout the die body.

The die was then ground along the crack from both sides leaving 1/32 inch of original metal in the center to maintain alignment. Metal was removed to form a U-shaped channel so that the first pass could get fully to the bottom. Then the die was preheated to a few degrees below the draw temperature and welded. In selecting the correct electrode, first consideration was given to obtaining one whose type was the same as the parent metal and of a size that would lend itself to easy application without possibility of exceeding the draw range.

*Senior member ASTE Golden Gate chapter.

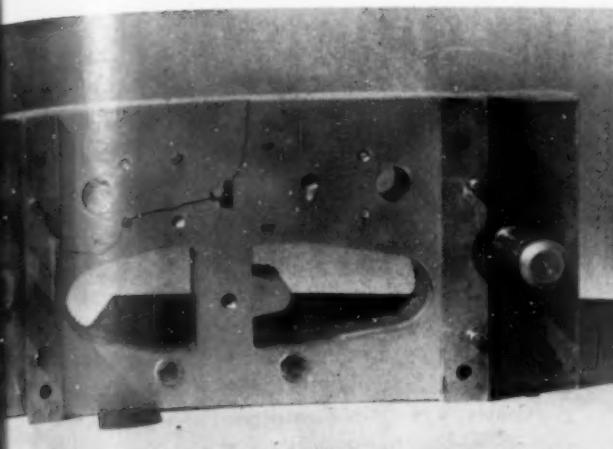


Fig. 2. Before and after repair views of a cracked blanking die. Repaired and replaced in one day, the die prevented a lengthy shutdown.

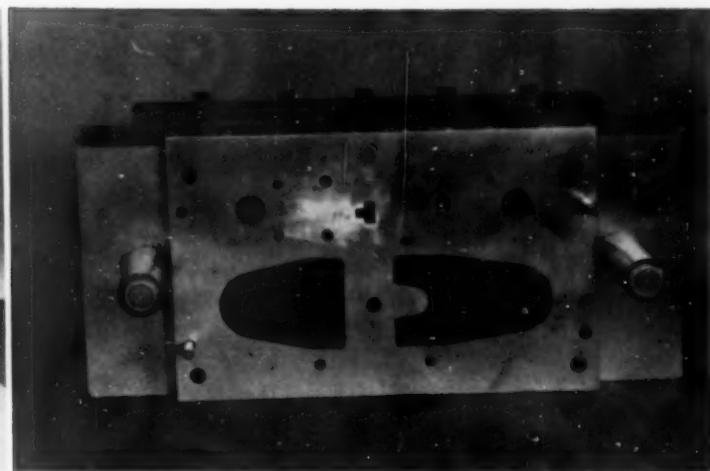
On this job, to get as close to 100 percent depth as possible, it was decided to use Speedex (Metal & Thermit Co.) as a filler rod because it has a low penetration and good tensile strength. Also, the deposit will not pull away from the tool steel when considerable material is added. Alloy rods, oil hard, were used for the last passes because these were made over the body and along cutting edges. After the welding operations were finished, the die was allowed to cool before postheating to 375 F for purposes of stress relief.

The job was performed by an experienced welder who had an opportunity to prearrange his surroundings so that all needed conveniences and facilities were available. This type of work requires operator integrity. If, for instance, small slag pockets form, the welder is the only one who knows it. Rather than bridge such craters, he must hold up progress to grind out the flaws and fill them as required.

After machining to specifications, the die was carefully inspected and assembled before it was returned to the press for installation. The whole process was accomplished in less than one day. The cost of the work was slight in comparison to the intangible aspects of the high stakes involved.

Another interesting job that is typical of this type of tool salvage involved a shear blade. This blade had two chips broken out of the high-carbon high-chrome insert, Fig. 3. For preparation, the chipped sections were ground past the tool steel insert to the tough base of the blade.

Then it was brought to and held at a temperature between 375 and 400 F by means of a gas burner especially built for such purposes. Because of the



small weld passes, it is necessary to keep such blades hot at all times. On this particular job, a 3/32-inch high-carbon high-chrome rod called Tool Steel B (Metal & Thermit Co.) was used. After welding, the blade was permitted to cool to room temperature, then postheated to about 275 F for three hours to allow stabilization. The expense of this repair was also negligible in comparison with the possibility of a costly delay which factory replacement of the part might entail.

Another outstanding job involved a collet-closing shoe from an automatic screw machine which had become worn from continual use. To repair this water-hardening tool steel part, Fig. 4, it was pre-

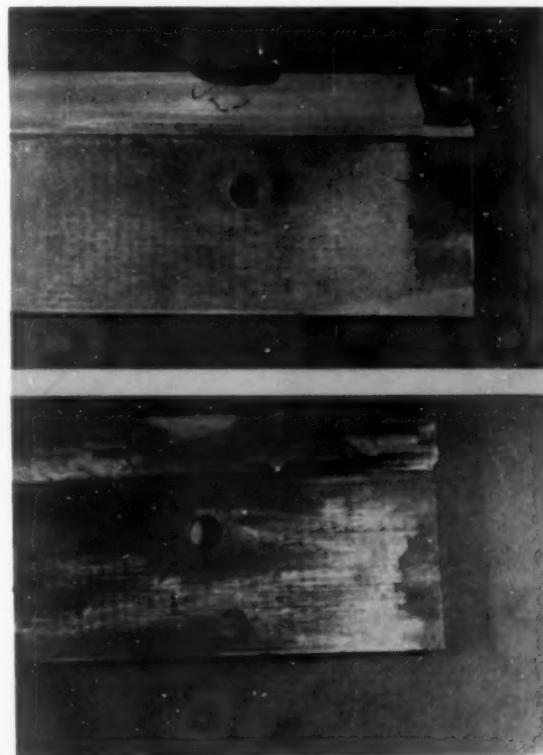


Fig. 3. Views of a high-speed steel shear blade, before and after welding. The chipped blade was repaired with a high-carbon high-chrome rod.

heated to about 375 F in an electric oven and then welded with a rod called Tool Arc Water Hardening Rod (Alloy Rod Co.).

Because of the amount of tool steel required, the weld was carefully peened after each pass to fore-stall any cracks which might occur if cold peening was inadvertently done. The rod goes on at 58-60 C Rockwell. Hence, after cooling to between 110 and 125 F, the shoe was returned to the oven and heated to 275 to 300 F for stabilization. Subsequent to gradual cooling in the oven it was transferred to the die shop for grinding and rechecking.

An interesting tool salvage job involved a 1½-inch high-speed, hollow-core, oil-feeding drill that had become too short from repeated sharpenings. Also, it had worn undersize at the flutes.

After examination it was decided to add 4½ inches of 4130 steel between the taper shank and the drill body. The piece of 4130 was machined to fit the flutes and drilled to match the inside oil holes. On this job, plans were made to build up the cutting end of the drill and deposit material at various points

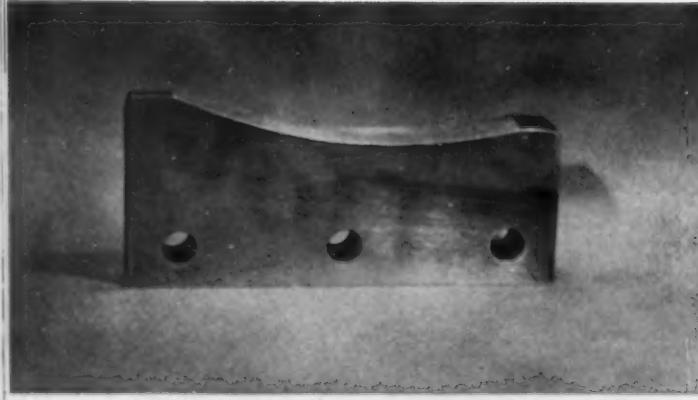
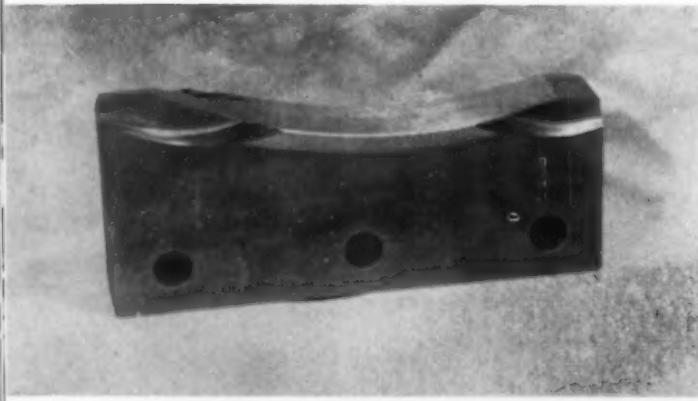


Fig. 4. (above) Closing shoe for an automatic screw machine collet restored by arc welding and careful peening over hot surface. Both pre-heating and postheating were closely controlled.

Fig. 5. (right) Checking weld deposit on broach mounted in special steady rests on a lathe for easy rotation while retaining accurate alignment.

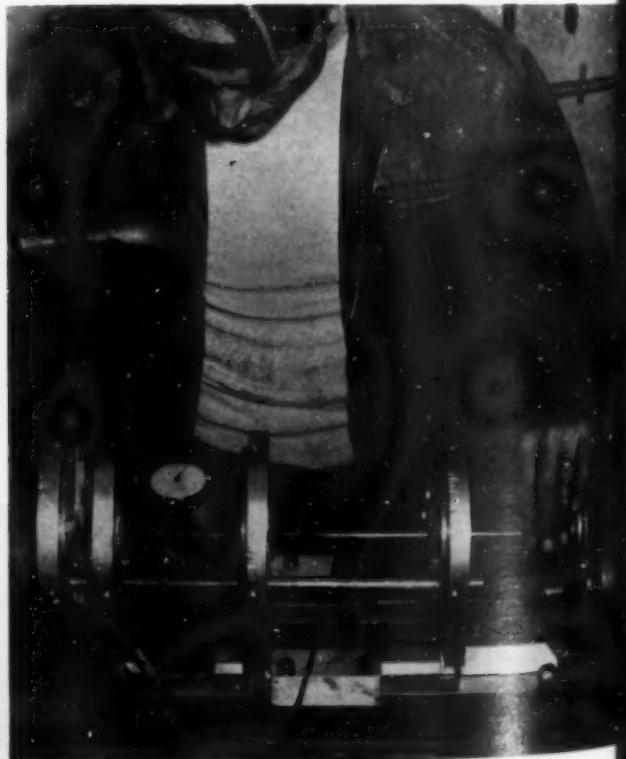
along the lands to restore the original OD.

The problem of maintaining extreme accuracy of alignment was overcome by holding the drill body within a pair of sleeves bored to match the drill OD. It could then be held true on special preset lathe steady rests while the taper shank rested in the headstock. The 4½-inch insert was welded to the taper and to the high-speed shank with 310 stainless steel.

During the application of high-speed type rod (Eureka No. 2) to the flutes, the drill was heated by oxyacetelyne torch and rotated to minimize warpage caused by uneven heating. Precise alignment during welding and final grinding, subsequent to cutting off the sleeves, was maintained by a piece of steel temporarily welded to the cutting end and center drilled to fit the tailstock center.

In Fig. 5 is shown a setup using specially constructed steady rests to maintain accuracy while deposit of Eureka No. 2 high-speed rod is checked on a small broach. A steel bar passing between the steady rests connects the steady rest faceplates. These faceplates are mounted in their frames in large-diameter-antifriction bearings, permitting the job to be rotated at will. Tolerance of 0.0004 inch is never exceeded.

From these examples, it can be seen that a high degree of success may be obtained if the job is handled with the necessary skill and care. Such work, however, requires highly trained specialists because it is impractical for the average shop to stock material and equipment for repairing the occasional die or tool which breaks in daily usage.



ceramics

prove useful in tooling

By Robert F. Rea

Manager, Research and Development
Stupakoff Ceramic Mfg. Co.
Latrobe, Pa.

This and the following two articles have been prepared from papers to be presented at the 1955 Western Industrial Exposition and Convention of the American Society of Tool Engineers in Los Angeles. The complete program for the technical session starts on Page 148.

AS A RESULT of current work with ceramics it appears that the metalworking industry may be on the threshold of another advance similar to the one caused by the introduction of carbides. Present developments point toward utilizing known advantages of ceramics and minimizing their limitations in various industrial applications. A typical and outstanding application is illustrated in Fig. 1.

Ceramics have been given a broader definition than that encompassed by the common clay forms. Four accepted requirements for ceramics are that the material be inorganic, nonmetallic, formed at high temperature (above red heat) and man-made. Many ceramic materials use little or no clay. Among these are artificial abrasives, spark plugs, super-refractories, steatite and titanate insulators, glass, and porcelain enamel.

In most of these nonclay ceramics, the basic material is one or more of the oxides of aluminum, silicon, magnesium, titanium or beryllium. Aluminum oxide, for instance, as used for electrical insulators and for many other applications, is generally better than 99.8 percent pure.

Abstracted from paper 23T12, "Ceramic Parts and Tooling for Mechanical Applications," to be presented at the 23rd ASTE Annual Meeting. Copies of the complete paper will be available from Society Headquarters.

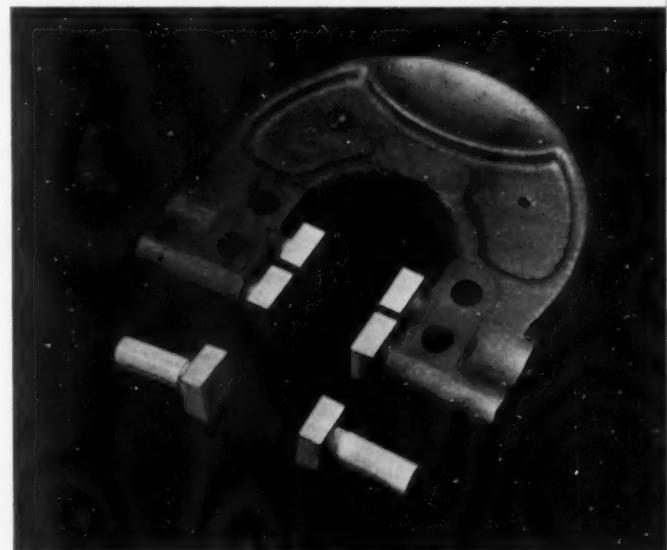
Applications discussed will be confined to the field of crystalline oxides to distinguish them from vitreous oxides and glass, which have many mechanical applications in themselves.

Properties of these materials are of primary interest to the tool engineer for a comparison with other materials such as tool steels, cemented carbides, etc. Most of these properties are considered as physical although certain chemical and electrical properties are also of interest.

Hardness and Wear Resistance: Hardness is an important property, yet is difficult to measure or describe for ceramic materials. This is because no satisfactory system of measuring hardness has been developed.

Scales of hardness of the metallurgist, such as Rockwell and Brinell, have limitations in measuring

Fig. 1. Snap gage with ceramic inserts has a much greater service life than that of a conventional gage.



relative hardness of ceramic materials and their use has not been widely accepted.

From the practical standpoint, hardness is less important than abrasion or wear resistance. Although related, a direct measurement of wear resistance generally is of more value than hardness tests. Many methods of measuring wear resistance are in regular use. Usually, a test is designed for a particular set of conditions and a particular product, such as the handblast methods used in grading abrasive wheels. Such tests are generally satisfactory, permitting comparisons with other products used for the same purpose.

While aluminum oxide compositions have the greatest hardness of the oxide-type ceramics, other materials are also used for wear-resistant parts. Ordinary porcelain, although relatively less hard, has good wear resistance and is used under conditions of severe abrasion. Improved ceramic compositions containing substantial amounts of zircon, corundum and mullite (a crystalline aluminum silicate) have superior wear resistance.

Strength: In general, ceramic materials at room temperature are high in compressive strength but have low tensile strength in comparison with alloy steels. As with most materials, elevated temperatures reduce these values, yet the degree of reduction is generally much less than that shown for metals,—particularly under conditions where oxidation becomes a factor.

Room temperature compressive strengths for the best ceramics range upward to over 300,000 psi for the best high alumina compositions. Tensile strengths of nonporous bodies range from 10,000 to over 35,000 psi, while synthetic sapphire is reported to be 65,000 psi.

Through proper design the inherent limitations of ceramic materials with respect to tensile and flexural strength can often be minimized. Insofar as possible, ceramics should be subjected only to compressive forces, using metals for carrying the tensile stresses. In this way, ceramics may be used in areas of severe wear, corrosion or high temperature, backed up with metal outside the area of the destructive forces.

The modulus of elasticity of ceramics is generally higher than that of metals. Although aluminum oxide is the least refractory of the four oxides of aluminum, beryllium, zirconium and thorium, it shows the best high temperature values.

Thermal and Electrical Properties: For ceramic materials, thermal expansion properties vary from negative values to that of carbon steel. A recent development has been a group of ceramic bodies based on lithium, one having a zero coefficient and another a negative expansion. High expansion increases the tendency for a material to rupture due to thermal shock. Those with low ex-

pansion rates have outstanding thermal shock resistance. Other factors, mainly strength and thermal conductivity, play a lesser role in determining thermal shock resistance. The ability of alumina porcelain to withstand temperature changes is greater than its expansion coefficient would suggest, due largely to higher strength and thermal conductivity values.

A second reason for considering thermal expansion is for use with another material. Expansion coefficients of the various components of a product should not differ widely. For example, a ceramic sleeve over a steel shaft would be unsatisfactory if the temperature were raised even a few hundred degrees, since the greater expansion of the shaft would place the ceramic in excessive tension. Likewise, difficulties may be encountered where a metal surrounds a ceramic part.

Ceramic materials are poor thermal conductors although there are exceptions. Beryllium oxide has remarkably good thermal shock resistance because its thermal expansion (7.3×10^{-6}) is moderately high for a ceramic material. Generally, ceramic materials of the oxide type are nonconductors of electricity at room temperature and are nonmagnetic. Aluminum oxide shows a specific resistance of ten million ohms at 1832 F.



Fig. 2. Precision ceramic coil and gages for checking critical dimensions.

Density: The lower density of ceramic materials, compared to alloy steel is frequently an advantage. For instance, the tensile stresses set up in a rotating member are proportional to the density of the material. The lower stresses, where ceramics are used, compensate somewhat for the lower strength.

Chemical Resistance: The resistance of oxide ceramics to attack by most acids, chemicals and gases is generally excellent. In this respect they are in a class by themselves and this constitutes

one of their greatest advantages as a material for mechanical applications.

Cost: Cost is often important in determining whether to use one material or another for a particular purpose. While many factors enter into the final cost of a mechanical part, assuming fabrication problems are similar, the cost of the material prior to final grinding or machining should be a fair basis for comparison.

Basic material cost of a ceramic is from $\frac{1}{3}$ to $\frac{2}{3}$ that of a low-quality steel. Also, ceramic raw materials are available in sufficient quantity. However, many of the alloying elements such as cobalt and tungsten were under severe restrictions during the past emergency.

Fabricating Methods: Many final finishing operations are being performed after firing. Although normal metal-cutting operations have not been successfully performed on fired ceramics, grinding and lapping operations are common procedures. These require the use of abrasive wheels of aluminum oxide, silicon carbide or diamond. Depending on the grit of the abrasive and grinding techniques, high finishes are obtainable. In fabrication, dimensional stability due to freedom from

typical steel gage would check 15,000 cases before 0.0001 inch of wear resulted. By comparison, high alumina ceramic gages have been used for 350,000 cases for the same amount of wear.

A precision ceramic coil form and three ceramic gages used in the checking of the coil are shown in Fig. 2. The ring gage is used for checking the OD of the collar, the large plug gage the ID of the collar end and the small gage for checking a hole in the opposite end of the coil (not shown). Actually, there are two gages of each type, a go and a not-go gage. This particular coil is an extremely hard ceramic composition and the gages are also ceramic to resist wear and to prevent marking the surface. The coil is used in electronic equipment where metallic particles on the surface cannot be tolerated.

The threads are cut in the coil with diamond wheels after firing. Tolerances of plus or minus 0.001 inch are held on many dimensions and 0.010 inch cumulative is maintained on the threads, indicating the possibilities of holding close dimensional tolerances on ceramic parts.

A camber gage, Fig. 3, is used for checking ceramic capacitor plates. As in the case of the plug gages for the coil form, marking of the plates by abraded metal would be undesirable.

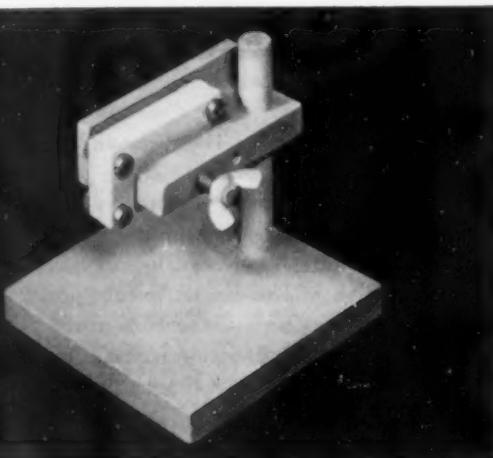


Fig. 3. Ceramic camber gage.

residual strain is an important advantage.

Possibilities of using ceramic materials to replace steel in many applications are promising. Generally, the manufacturing cost of producing a part in ceramic is comparable to that of making it of hard steel. The precision obtainable is fully as good with ceramics. The life of a ceramic part has proved to be many times that of steel. Only cemented carbide materials can compare with ceramics in service life.

Gages: During the last war, ceramic plug gages were widely used for checking steel shell cases. A

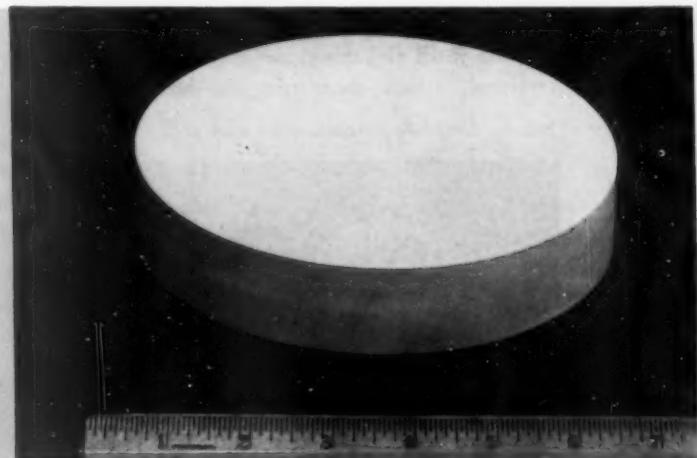


Fig. 4. Ceramic surface plate.

The snap gage shown in Fig. 1 has ceramic wearing inserts. These inserts, illustrated separately, are precision ground and show a life many times that of the best steel inserts.

Although experience with ceramic gages has been confined generally to the hardest alumina compositions, consideration might be given to the possibility of making master gages of a composition unaffected by temperature changes.

Surface Plates: Ceramic surface plates have the advantage of being far more wear resistant than either cast iron or granite. Ceramics, being free of



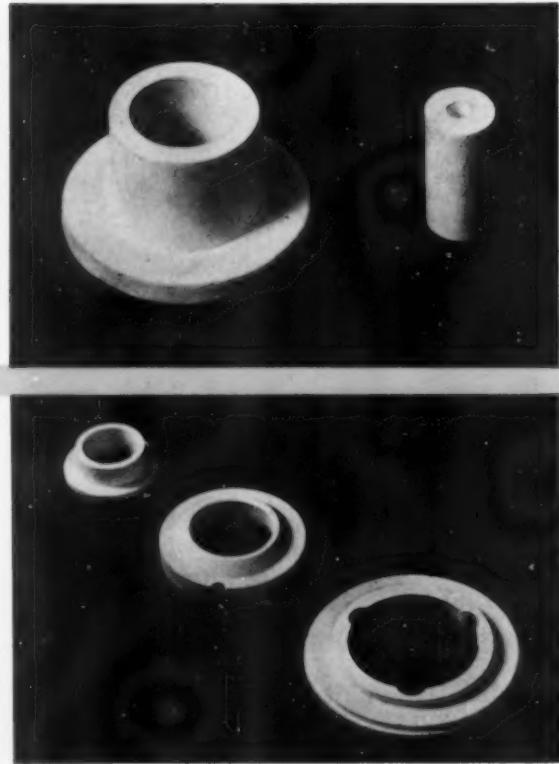
Fig. 5. Ceramic insert cutting tool.

residual strain, do not warp or distort in use but retain their precise flatness permanently. Further, unlike cast iron, they will not corrode. Such a surface plate, shown in Fig. 4, is made of a high alumina composition. Such a surface will not be scratched by the hardest metals or carbides.

Cutting Tool Tips: According to European reports, the use of sintered aluminum oxide cutting tools is gaining in favor. This application is under development in this country too, but so far little information is available.

The British state that for machining plastics and aluminum alloys sintered alumina is superior to carbides. The Russians claim that, even for cast iron and steel, ceramic tips outperform all other materials, including carbides. Both agree that freedom from excessive vibration is essential for success. Under proper operating conditions, the alumina tips permit much greater turning speeds in lathe work and the amount of metal that can be removed before sharpening is far greater for

Fig. 6. Ceramic extrusion die and pin.



ceramic tools than for tools of other materials.

This superior performance of the sintered aluminum oxide would appear to be due to its resistance to high temperatures. The red-hardness temperature is 2200 F for sintered alumina, 1560 F for two hard alloys and 1100 F for high-speed steel. An experimental tool of sintered aluminum oxide is shown in Fig. 5.

Welding and Brazing Fixtures: This application requires both stability and thermal shock resistance in fixture materials. Ceramic compositions of low thermal expansion should, therefore, have wide application for this purpose. The zero-expansion lithium bodies are gaining favor for such applications. Material of this type can be heated to 2000 F and plunged into ice water repeatedly without failure, although such extreme treatment is seldom encountered in practice.

Extrusion Dies: Ceramic dies are often used in the extrusion of plastic ceramic bodies. The die and pin of high alumina composition shown in Fig. 6 was designed for extruding abrasive tubing of a similar composition. In addition to having greater life, such tools eliminate contamination of the extruded part with metals.

Miscellaneous Parts: A watch or instrument "jewel" is actually a ceramic bearing. Much larger bearings made of wear-resistant ceramics are being used in centrifugal pumps handling corrosive liquids and chemicals. The Germans during the last war are known to have made experimental ceramic roller bearings, presumably for aircraft use. Most of this work apparently has gone behind the iron curtain, as evidenced by brief mention of this application in Russian technical journals. Research is being actively carried on in this country to develop ceramic antifriction bearings for application at temperatures above those at which the best steel bearings can perform.

Rotary shaft seals are being studied currently by several manufacturers in this country. Three designs of such seals are shown in Fig. 7. Preliminary results are encouraging and suggest commercial use in the near future.

Centerless grinding guides, sleeves, bushings, plungers, pistons, sandblast and spray nozzles are other examples of successful uses of ceramics.

With recent commercial development of the high-strength alumina ceramics and other special compositions, coupled with improved fabrication and finishing techniques, it is evident that tooling applications as well as wear and high-temperature uses of these materials will greatly increase.

Fig. 7. (bottom left) Rotary shaft seals.

DRILLING RESEARCH

points to production improvements

By Carl J. Oxford, Jr.*

Research Engineer
National Twist Drill and Tool Co.
Rochester, Mich.

ALTHOUGH SIMPLE IN APPEARANCE, twist drills are the most geometrically complex cutting tools in common use. The complex geometry and the fact that cutting action cannot be seen while the drill is in operation have combined to delay a complete understanding of the fundamental mechanics of drilling. Only recently have the basic mechanics been investigated and this has resulted in the first rigorous analysis of twist drill geometry.

By using an apparatus that would quickly stop the cutting, Fig. 1, and then carefully sectioning the workpiece, it has been possible to determine the nature of metal deformation during drilling. It was found that the cutting process along the lips, Fig. 2, is essentially similar to that in other cutting operations. There is the expected shear zone (or plane) and upward elongation of the metal structure in the chip after it passes through the shear zone.

*Senior member ASTE Detroit chapter.

Abstracted from paper 23T5, "Some Recent Research on Twist Drills and Drilling," to be presented at the 23rd ASTE Annual Meeting. Copies of the complete paper will be available from Society Headquarters.

Under the chisel edge or web portion of the drill, the metal flow is different. Deformation is severe and complex, Fig. 3. The process involved in this region appears to be a combined indenting-cutting-extrusion operation yielding a highly deformed ribbon chip that eventually escapes into the flute. Distortion of the metal structure in this region suggests qualitatively why twist drills require large axial thrust forces.

Analysis has revealed that the effective rake angle of twist drills is positive across the entire lengths of the cutting edges. This is because the cutting edges near the drill center (not including the chisel edge) have a high inclination to the direction of motion and produce a shearing cut. This means that the chip is deflected through a lesser angle than it would if it flowed normal to the cutting edge as has been assumed. A plot of effective rake angle along the cutting edge of a $\frac{3}{4}$ -inch twist drill is shown in Fig. 4. Near the web, the effective rake angle is appreciably positive while the normal (or tool) rake angle is highly negative. This condition may explain why the twist drill develops an over-all power efficiency comparable to that of more conventional cutting tools.

Twist Drill Life: The relationship between speed, feed and twist drill life appears to be similar to that encountered with other tools when operated in the usual ranges and with usual materials where tool life is limited by temperature effects. The classical exponential relationship between tool life in minutes, T , and cutting speed, V :

$$VT^n = C$$

seems to hold. However, when drilling steel with

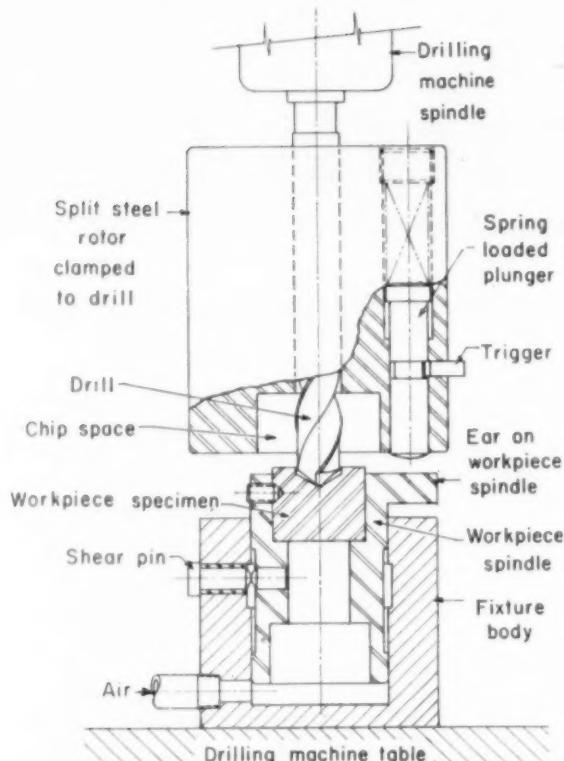
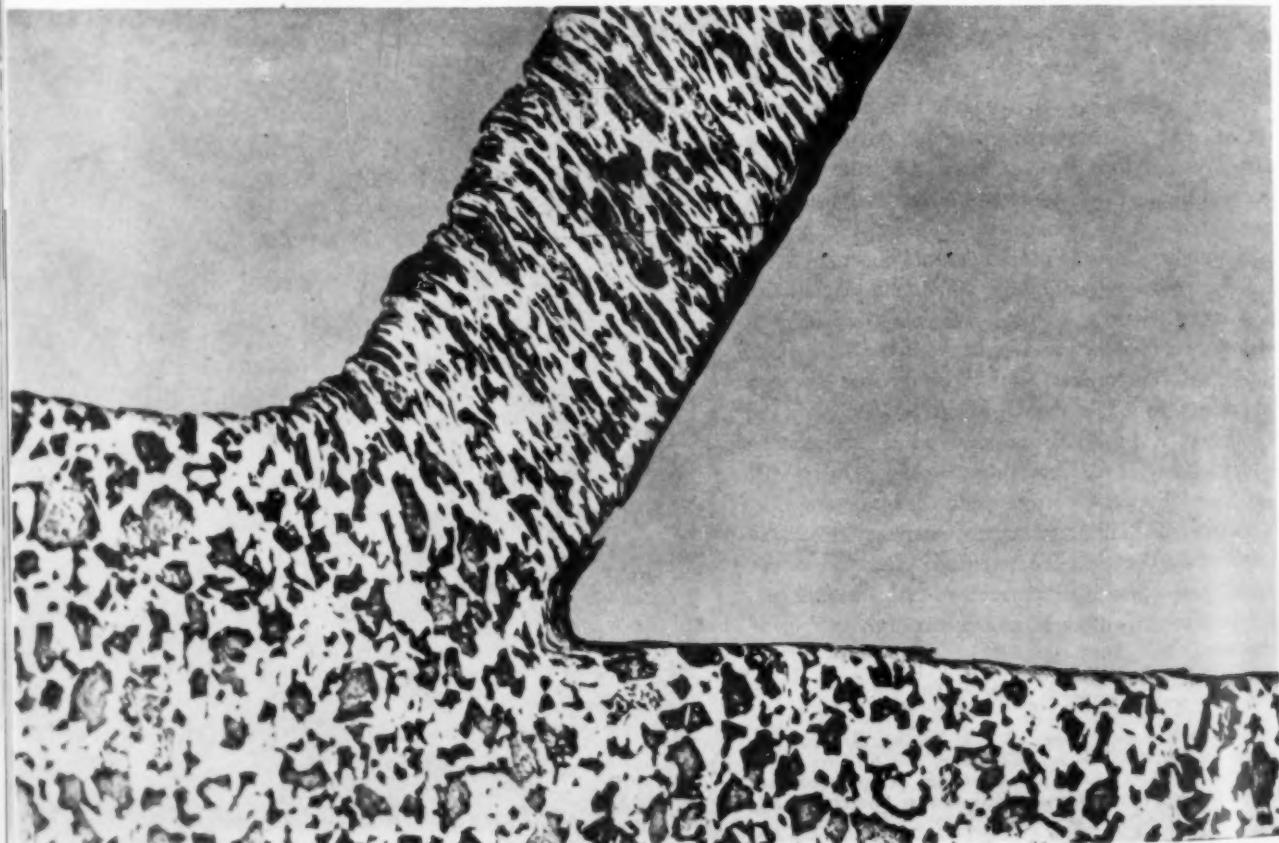


Fig. 1. Diagram of quick-stop apparatus used to investigate fundamental mechanics of drilling.

Fig. 2. Photomicrographic section through chip produced by cutting edges of drill.



high-speed steel drills, exponent n lies between 0.25 and 0.35 instead of 0.10 to 0.15 as when turning steel with high-speed steel tools. This means that twist drill life is less sensitive to cutting speed changes than that of corresponding turning tools.

There is a similar exponential relationship between feed rate and tool life but the value of the exponent is uncertain due to the difficulty in accurately determining the end of life for a twist drill. The end point is even more difficult to determine when feed rate is a variable since there is some evidence that a somewhat different type of failure is encountered when the feed is either too low or too high. This means that drill feed rates must be held within a fairly narrow range for each size of drill. It is clear that best tool life for a given rate of metal removal is obtained by using the highest possible feed that results in free chip ejection.

When drilling materials with severe work-hardening tendencies, high feeds are mandatory for satisfactory tool life. When drilling S-816, a cobalt-base alloy, with a $\frac{9}{16}$ -inch drill, increasing the feed from 0.005 to 0.010 ipr more than doubles drill life.

Because drill cutting edges are elastically coupled to the drilling machine spindle through the drill, drill length also affects life. The principal flexibility is torsional and most of it is in the fluted section. Magnitude of this deflection can be emphasized by

noting that a standard drill in the $\frac{1}{8}$ to $\frac{3}{16}$ -inch range can be wound through an angle of 60 to 90 deg before it will break. As the strength of the drilled material increases, the amount of windup increases. When variations are encountered in the workpiece, the amount of windup changes and, if repeated rapidly, can result in chatter. Rapid changes in torsional loading of the drill are often encountered at entry and breakthrough, particularly when scale is present.

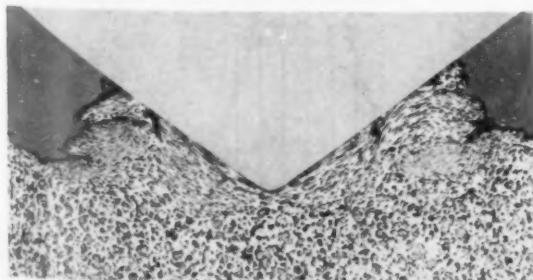
Destructive torsional chatter may not always be obvious. Fig. 5 is a plot of drill life against flute length with standard length heavy-duty drills. As the flute length is shortened from $2\frac{7}{8}$ to $1\frac{11}{16}$ inch, drill life increases more than 80 times. With ordinary work materials, this effect is not as striking but a decrease in flute length always increases drill life. Where a long reach is necessary, significant tool life increase is gained by using a short-fluted drill with a long shank.

When long-fluted drills must be used in tough materials, the web thickness should be increased and the flute space decreased to maintain stiffness. Such drills must be frequently withdrawn to clear chips. The use of a split point or other web thinning is necessary to reduce thrust, and prevent buckling and breakage. The split point also breaks chips into smaller pieces.

Drilled-Hole Size: There has recently been much interest in the actual size of holes produced by drilling. This is of particular importance when the holes are to be tapped and becomes vital if the thread pitch is fine in comparison to the diameter or if the length of engagement is a small fraction of the nominal screw diameter. Fortunately, for ordinary lengths of engagement, the tap drill size is not critical if the percentage of thread height is 60 percent or more.

To determine the amount of oversize to be expected in normal drilling, the Metal Cutting Tool Institute conducted a series of tests on various sizes of drills operating in steel and cast iron. Results of these tests are summarized in Fig. 6. The center curve shows the average oversize to be expected and the other two curves indicate the range

Fig. 3. Photomicrographic section through drill axis normal to chisel edge shows deformation.



of oversize variation to be expected. The range of variation indicates that it is generally not possible to compensate for oversize by reducing drill diameters. The values given in the curves can be approximated within about 0.001 inch for $\frac{1}{8}$ to 1-inch drills by the following relations:

$$\text{Average Oversize equals } 0.002 \text{ plus } 0.005D$$

$$\text{Maximum Oversize equals } 0.005 \text{ plus } 0.005D$$

$$\text{Minimum Oversize equals } 0.001 \text{ plus } 0.003D$$

where D is the nominal drill diameter in inches.

While the oversize values given are based on cast iron and steel, they apply approximately to most metals except nonferrous materials with large thermal coefficients and high production rates. It is possible to have so much thermal expansion of nonferrous metals that, upon cooling, the drilled

Fig. 4. Effects of drill design on effective rake angles are shown by this plot of test data on two $\frac{3}{4}$ -inch twist drills of different design. Characteristics of the regular and heavy-duty drills, respectively, are: web thickness, 0.110 and 0.190 inch; flute lead, 3.77 and 3.30 inches; helix angle, 32 and 35.5 deg, and point angle, 133 and 135.5 deg.

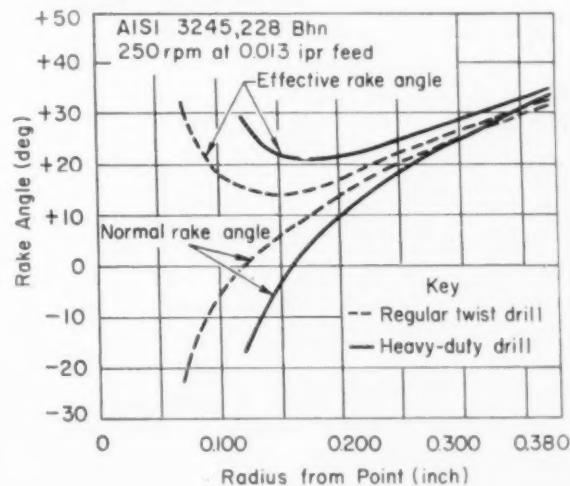
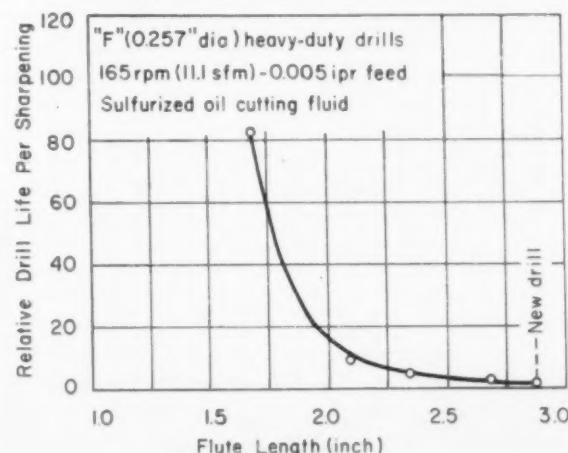


Fig. 5. Drilling of S-816 high-temperature alloy vividly portrays the effects of flute length on drill life. Data points are averages for 6 drills.



hole may actually be smaller than the drill diameter.

It is evident that the two-flute twist drill, as ordinarily used, cannot be considered a precision hole producing tool. Where size must be held to close limits, a precision sizing operation such as reaming, boring or gun drilling must be used.

Performance Variations: Twist drills appear to be more sensitive than most other tools to small variations in tool geometry and in the machinability of the workpiece. Further, there is considerable difficulty in accurately determining the end of twist drill life. Types of dulling vary widely so that wear-land measurements are not reliable. Sometimes wear develops in such a way that the drill is almost self sharpening. Power input to the drilling machine increases slowly until total destruction is reached. Then it increases so rapidly that the machine may not be stopped in time to permit reconditioning of the drill. There is some indication that the increase in drill thrust force may be a good indicator of drill dulling but this cannot be generally used because it requires a dynamometer. The most used indicator of actual or incipient drill failure is the sound the drill makes.

Drill testing is not hopeless but fairly long tests involving a large number of drills are necessary. Even with a large number of drills on test, the range of scatter often exceeds ± 50 percent of the average value. Summary of the results of tests on 296 identical drills run under identical conditions for the first grind is shown in Fig. 7. The bar charts form a histogram showing the actual frequency with which a given tool life was obtained (reduced to a least count of 10 holes). The superimposed curve is a normal probability curve based on the test data. Average drill life is about 68 holes and range of the standard deviations, which includes

slightly more than two-thirds of the test data, is 47 holes to 89 holes, a spread of about ± 31 percent.

Since the normal probability curve fits the data reasonably well, it can be assumed that most of the scatter of test results is due to random or accidental factors. These include: material drilled, coolant, machine setup, drill sharpening, drill geometry, drill tool material, drill heat treatment and uncertainty as to the exact point of failure. Statistical manipulation of the data by test groups indicates that about half of the scatter is due to variations in the drillability of the material drilled and the remainder can be attributed principally to the drill and uncertainty as to the drill failure point.

While this discussion is based on carefully controlled laboratory observations, the findings are applicable to shop operating conditions except that the scatter in performance is likely to be greater in the shop. There is also a high probability that shop tests involving only a few drills can give misleading results, particularly if the indicated difference in performance is small. When looking for a small difference in performance, 50 or more drills must be tested and the results averaged. Large variations in drillability of commercial metals must be expected. The effect of material variations on test results can be greatly diminished if the drills being compared can be run on the same workpiece and, if possible, in the same drilling machine spindle.

The chances of unpredictable drill failure in production can be greatly reduced if drills are not run to failure but are removed for resharpening after drilling two-thirds to three-quarters of the number of holes required to cause average failure. Incidentally, such practice greatly reduces resharpening costs since drill damage rises precipitously at the failure point.

Fig. 6. Average and range of oversize holes produced by drilling steel and cast iron.

—Data courtesy Metal Cutting Tool Institute

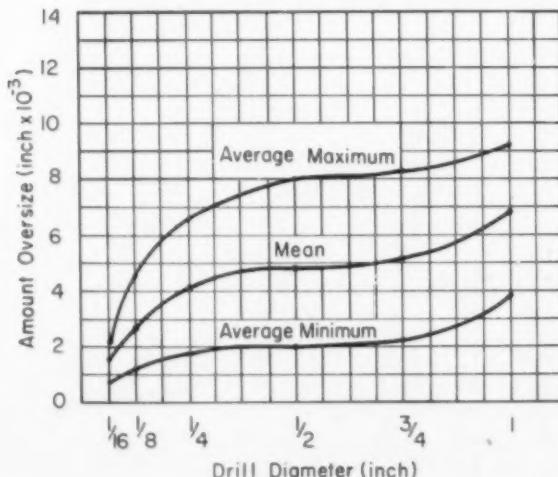
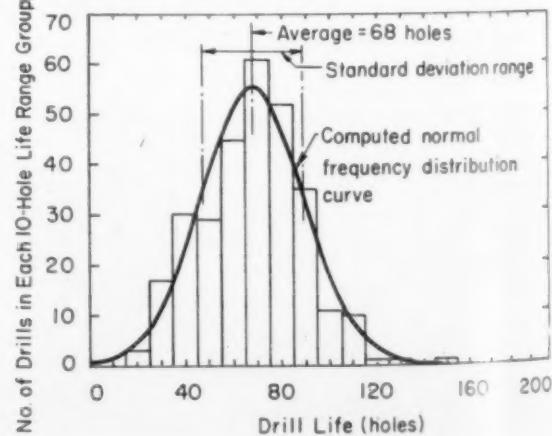


Fig. 7. Results of 296 identical drilling tests with $\frac{3}{16}$ inch twist drills on SAE 3245 heat treated to 228 Bhn. Test steel was produced in an electric oven to tool steel tolerances. Test data were accumulated over a period of seven years.



CLAMPED CHIP BREAKERS

their advantages and design

By Erik K. Henriksen

Dept. of Mechanical Engineering
University of Missouri
Columbia, Mo.

THE CHIP BREAKER is a compromise rather than an ideal solution to the problem of chip control when cutting at high speeds with sintered carbide tools. At high cutting speeds, chip flow is out of control when compared with that obtained at the more moderate speeds used with tools of steel. The moderate speed chip has a natural tendency to curl whereas this curling tendency is, in most cases, absent in high-speed chips.

Step Type Chip Breaker: The most common type of chip breaker, the step type, consists of a step or platform ground into the face of the cutting tool. This type of chip breaker has conventionally been characterized by its two principal dimensions, width w and height h . Tables giving recommended values of the width in relation to feed and depth of cut, and also with some recommendations as to the height, have been published.

The deciding dimension of a chip breaker is neither the width nor height but the radius of bending B of the chip flow circle, which can be inscribed in the chip breaker. When two chip breakers have the same radius of bending, they will break the chip in the same manner and pattern, *Fig. 1*.

The following geometrical relationship, called the Copenhagen formula, exists between the chip breaker dimensions and the radius of bending, *Fig. 2*:

$$B = \frac{w^2}{2h} + \frac{h}{2} \quad \dots \dots \dots \quad (1)$$

From this formula graphs and tables can be constructed for conversion of values of B , w and h to

Abstracted from paper 23T4, "Findings and Directions in Chip Breakers Research, Chip Breakers without Diamonds," to be presented at the 23rd ASTE Annual Meeting. Copies of the complete paper will be available from Society Headquarters.

guide tool designers and toolroom personnel.

Certain chip forms and chip patterns are representative of well broken chips, others are representative of unbroken chips. Repeatedly, it has been found that there is a close relationship between the feed and the chip pattern. Thus certain feeds would always produce broken chips; other feeds, applied with the same chip breaker and under the same cutting conditions, produce unbroken chips. These feeds, determined experimentally, change with the

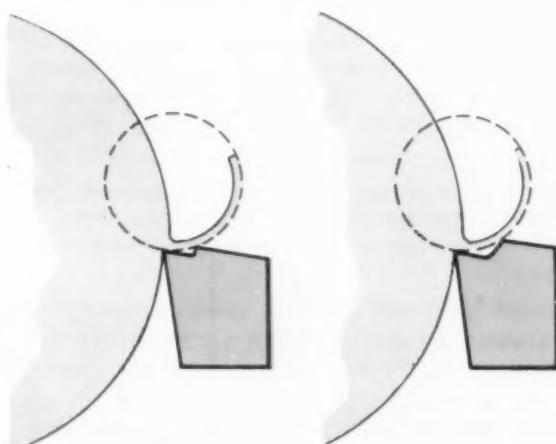


Fig. 1. Principle of the chip-flow circle. Two chip breakers of different heights and widths but with the same chip-flow circle radius.

size of the chip-flow circle radius, B . When plotted, they result in a parabola-like curve for each type of chip, called the Copenhagen parabolas, *Fig. 3*.

From the comprehensive chip classification chart by Schallbroch and guided by the works of Lang and Hemscheidt, the author extracted a simplified

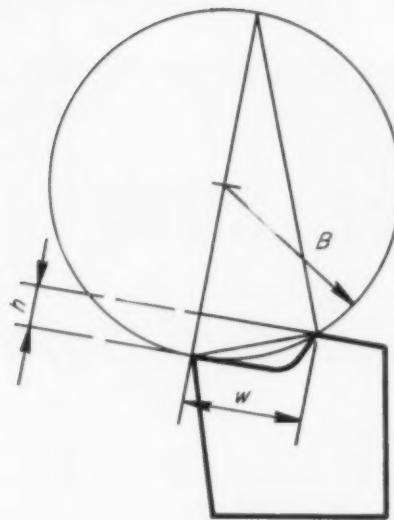


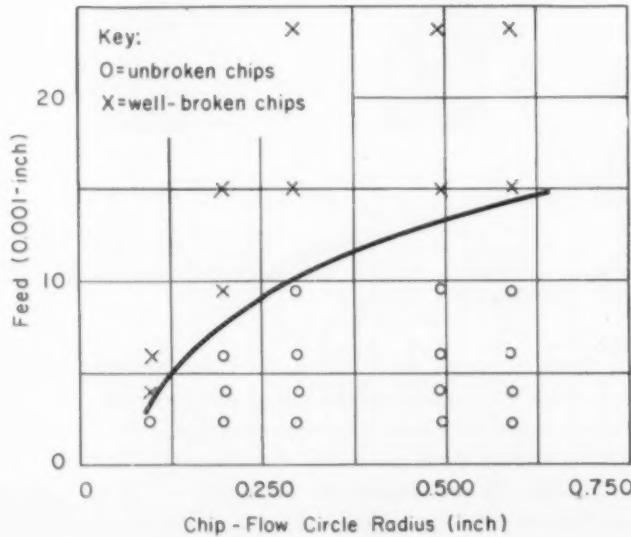
Fig. 2. Geometry of the chip-flow circle.

classification table and selected usable and preferred groups of chip patterns as shown in the table.

Some of the principal significant results of the existing evidence are the following:

1. A chip breaker has a limited feed range in which it gives satisfactory performance. At feeds below this range it fails to break the chip; at feeds above, it produces overbroken chips.
2. There is no publicly known design of a chip breaker that will give satisfactory performance over a full practical range of feeds.
3. When excessive chip breaking or overbreaking occurs, tool life is endangered in two ways, through accelerated wear and through instantaneous damage.
4. The usable and preferred feed ranges vary from one material to another.
5. For any set of cutting conditions it is possible to design a chip breaker that will produce a properly curled or broken chip without undue strain on the tool or undue sacrifice of tool life.

Fig. 3. Characteristic parabolic curve separates areas between unbroken chips and well broken chips.



Evaluation of Chip Breaker Performance

Type of Chip	Effect of Feed
Straight	Increasing Feed
Snarling	
Infinite helices (corkscrew pattern)	
Regular intermittents (each piece more than one turn)	
Full turns	
Half turns	
Fragments and splinters	
Preferred Range	
Usable Range	

6. Chip breaking depends on cutting speed. Chip breaking becomes easier at low cutting speeds. Minimum chip breaking capacity seems to be attained at approximately 400 fpm and stays approximately constant up to or beyond 1000 fpm.
7. Coolants have little if any beneficial effect on chip breaking.

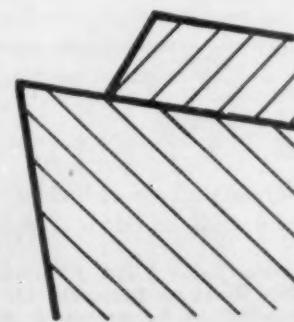
Through suitable scale transformation on the two axes, the Copenhagen parabolas, *Fig. 3*, are transferred into straight lines called the Missouri Straight Line Charts. This method of presenting chip breaker data offers several advantages in the practical application of the charts as well as in plotting new experimental data.

The conventional chip breaker of the ground step type is really a paradox. Efforts are constantly being directed towards improving the free and smooth flow of metal across the tool, reducing internal and external friction, and eliminating vibration sources to improve machining efficiency, tool life and surface quality. However, a chip breaker is a solid obstacle placed deliberately in the path of the chip stream, imposing additional deformation work, absorbing extra energy and creating a periodic variation in the forces on the tool.

The possibilities of basic improvements in these fundamental aspects of chip breaking will not be discussed. It will be assumed that chip breaking is to be performed by enforced chip bending.

Even within this limitation, there are, fortunately, some good possibilities for improvements of the

Fig. 4. Section through a clamped chip breaker.



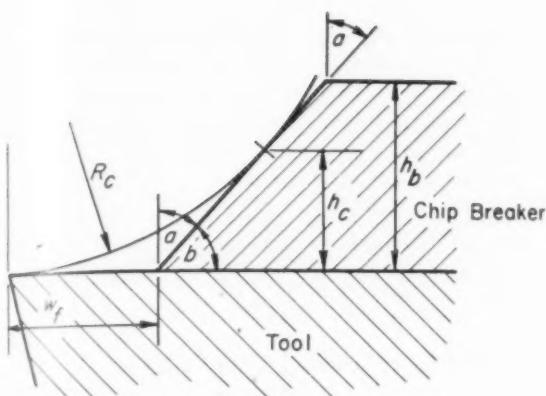


Fig. 5. (above) Principal dimensions of the clamped chip breaker.

Fig. 6. (top right) The chip-flow circle for the balanced design of a clamped chip breaker wherein line AF equals FC.

Fig. 7. (right) Geometry of the modified clamped chip breaker.

chip breaking technique. The conventional ground-step chip breaker has many objectionable features, of which the following are the most important:

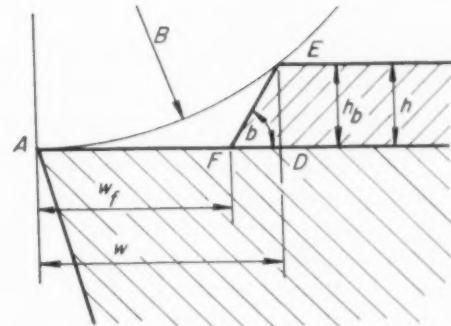
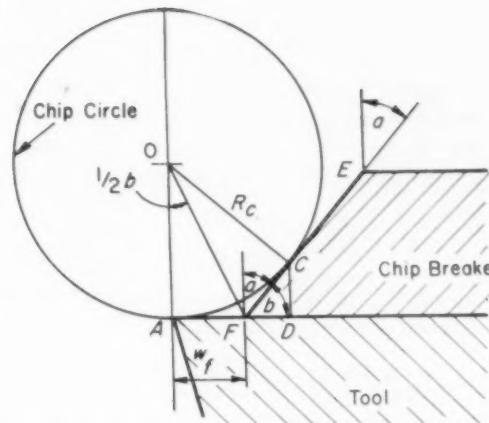
1. Grinding of a chip breaker constitutes a loss of carbide material and of useful dimensions of the carbide blank.
2. Grinding of chip breakers consumes diamond wheel material and working time.
3. Ground chip breaker is usually not adjustable, therefore its useful feed range is limited.

The Clamped Chip Breaker: The objectionable features of the ground-step chip breaker listed previously are not present in the clamped or built-up chip breaker. A general theory for this chip breaker with formulas and graphs for its practical application will be presented.

The clamped chip breaker, Fig. 4, is a block of hard material with a bevelled edge, the block being clamped firmly upon the tool face, usually in an adjustable manner. It differs significantly from the ground chip breaker in that the position of the block can be adjusted. Also, the height of the block is greater than that of the ground chip breaker. In normal operation of the clamped chip breaker there is area contact between the chip and the breaker, whereas the ground chip breaker normally provides only edge or line contact.

Its principal advantages, compared with the ground-step chip breaker, are:

1. It consumes no carbide material out of the tool blank.
2. It does not require diamond wheel grinding.
3. Its life is longer than that of the ground chip breaker.
4. Its regrinding is simpler, faster and cheaper, and so



- is the regrinding of the tool itself.
5. It can be made adjustable to suit any set of cutting conditions, instead of being limited to a narrow range of feeds.

To these well-established facts the author adds the following for which he does not claim more than a hypothetical possibility: the clamped chip breaker performs the same chip breaking with less additional load, strain and wear on the cutting tool.

It is hoped that a wider knowledge of the correct dimensioning of clamped chip breakers and their proper application will result in their general acceptance by the metal cutting industry.

Balanced Design of Clamped Chip Breaker: The significant dimension, which controls the action of the clamped chip breaker, is the radius of the chip-flow circle. Physically and numerically it is the same as the radius B , determined by Equation 1 (Copenhagen formula) for the ground chip breaker, but since it is determined geometrically by an entirely different formula, a new notation, R_c , is employed to eliminate the possibility of confusion.

Dimensions used in the design and adjustment of a clamped chip breaker tool, Fig. 5, are:

- w_f = Face width
 h_b = Height of block
 α = Heel angle
 h_c = Contact height

b = Bevel angle or block angle.

Contact height h_c is the height from the tool face to the point of contact between the chip-flow circle and the bevelled front of the chip breaker block. From Fig. 6 the following equations can be derived:

$$w_f = R_c \tan \frac{1}{2}b \quad \dots \dots \dots (2)$$

$$R_c = w_f \cot \frac{1}{2}b \quad \dots \dots \dots (3)$$

Equations 2 and 3 (Missouri formula) have three different basic applications:

1. In an existing clamped chip breaker tool the bevel angle b is known; the cutting conditions relating to the job determine the required radius R_c , and the formulas can be used for calculating the face width w_f to which the chip breaker should be adjusted.
2. For an existing tool, the formulas can be used for determining the extreme range of radii that can be obtained by the tool.
3. In the design stage of a new tool with a clamped chip breaker, the formulas can be used for selecting the proper values of w_f and b concurrently.

Limitation of Balanced Design: In a well-designed clamped chip breaker there should be a certain balance between the height of the block, the maximum face width and the bevel angle. There is a point of contact C between the chip-flow circle and the bevelled front of the chip breaker, located somewhere between F and E in Fig. 6. In the limiting case, the contact point C coincides with point E .

Referring to Fig. 5, it can be shown that

$$h_b \geq 2R_c \sin^2 \frac{1}{2}b \quad \dots \dots \dots (4)$$

This inequality can be used to analyze a chip breaker block with respect to the range of chip-flow circle radii that it can handle.

When the inequality indicates that the chip breaker will work as assumed over its entire adjustable range, Equation 3 can be applied to determine its chip-flow circle radius and thereby predict its performance on the job. Equation 2 is use-

ful for the correct setting of the chip breaker.

The balance can usually be established over the lower part of the range for the face width. If the design is not balanced at the upper end of the range, then this does not mean that the chip breaker will not work. It only means that the chip breaker action is modified. In fact, the clamped chip breaker becomes equivalent to a conventional ground chip breaker and its geometry does not follow the Missouri formula.

Modified Clamped Chip Breaker: The modification in the geometry and in the action of the clamped chip breaker of unbalanced dimensions is shown in Fig. 7. The chip-flow circle is now determined by point E , because the line FE is neither tangent to the circle nor equal to AF .

The situation is such that the Copenhagen formula, Equation 1, applies. It is only necessary to establish the conversion for the basic dimensions. This equation becomes

$$B = \frac{(w_f + h_b \cot b)^2}{2 h_b} + \frac{h_b}{2} \quad \dots \dots \dots (5)$$

The parenthesis can be developed and the equation rearranged in various manners; a graphical method is possible, but none of this leads to any appreciable simplification. The recommended method is to carry out the numerical calculations directly.

Experimental Data: As mentioned before, the results of chip breaker experiments can be plotted over the chip-flow circle radius as abscissa and the feed as ordinate; when that is done with regular arithmetic scales the result is a series of parabola-like curves.

A closer look at these curves will show that they are not exactly second degree, but a detailed analysis has brought out that they will satisfy with

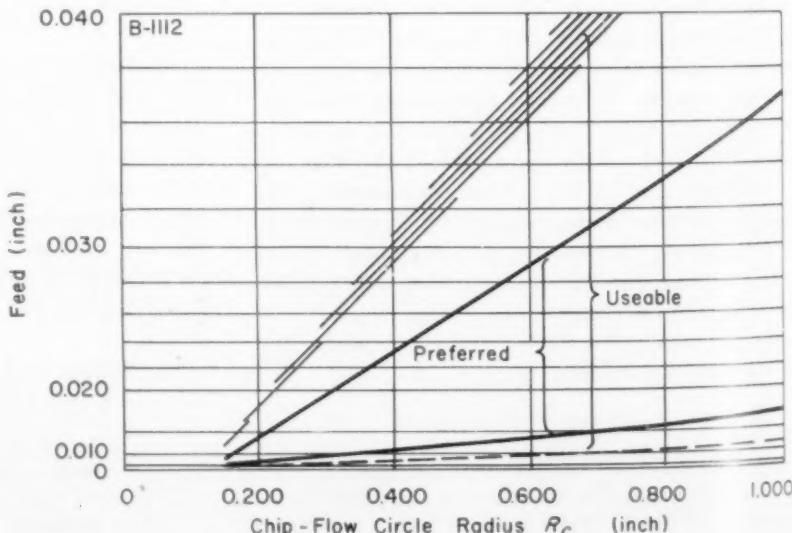


Fig. 8. Preferred and usable feed ranges as related to chip-flow circle radius R_c of clamped chip breaker. Free-cutting steel, B-1112; 55,000—75,000 psi tensile strength, 35,000—50,000 psi yield point, 126-150 Bhn.

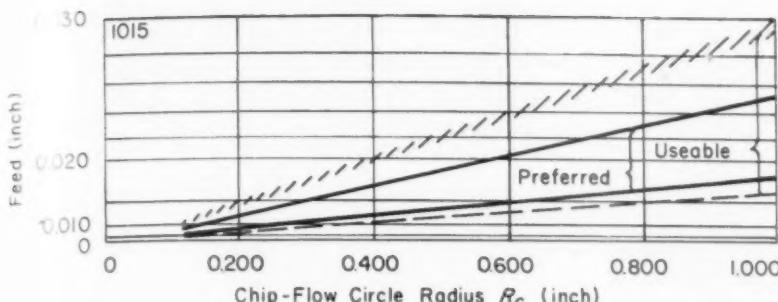


Fig. 9. Preferred and usable feed ranges as related to chip-flow circle radius R_c of clamper chip breaker. Plain carbon steel, C-1015: 47,000—60,000 psi tensile strength, 30,000—40,000 psi yield point, 101—140 Bhn.

reasonable accuracy an equation of the form

$$x = Cy^n$$

and n should have a value a little above 2, in fact $n = 2\frac{1}{2}$ gives a good over-all agreement with the results for three steels investigated (Cornell data); namely, B-1112, C-1015 and 4140.

A scale transformation on the vertical axis converts the curves into straight lines, and the result is the three graphs shown in Figs. 8, 9 and 10. In these graphs, the chip-flow radius scale is arithmetic. This permits the graph to be matched with a scale for the cross section of a clamped chip breaker.

If S_1 is the abscissa scale on the radius axis, and S_2 is the scale on an axis for the corresponding value of w_f , then the abscissas must have the following relation if the scales are to match:

$$S_2 = S_1 \tan 1/2 b \dots \dots \dots \quad (6)$$

As an example, face widths and chip-flow circle radii are plotted as abscissas in Fig. 11 so that face widths for balanced-design chip breakers may be read direct from the preferred feed range.

The experimental data from which Figs. 8, 9 and 10 are drawn were originally found by tests with ground chip breakers. A number of tests have also been made on clamped chip breakers of a variety of dimensions. The two sets of tests were plotted over the same scale for chip-flow circle radius, and they were found to match within normal experi-

mental spread. This provides an experimental proof of the statement that the chip-flow circle radius is the basic controlling dimension in a chip breaker, and it is equally valid for the two types of chip breakers.

Effect of Cutting Conditions: Although feed is the dominating factor in chip breaking, other cutting conditions play their part also. These are essentially: depth of cut, side cutting edge angle and cutting speed.

In practical calculations the combined effect of these cutting conditions can be taken care of by the use of multiplying factors, and there is nothing new or different in their application to clamped chip breakers.

Practical Observations: From another viewpoint, however, the clamped chip breaker is different from and superior to the ground chip breaker. It is usually more consistent in its action; there is less spread and variation in the chip pattern produced; and the chip pattern can, consequently, be predicted and obtained with greater accuracy.

The most important factor in controlling the clamped chip breaker's performance is the bevel angle. Various observations by the author and by others, seem to indicate that the chip breaker will work and perform in a usable manner over a large range of bevel angles. However, for small bevel angles, the action becomes soft and increasingly

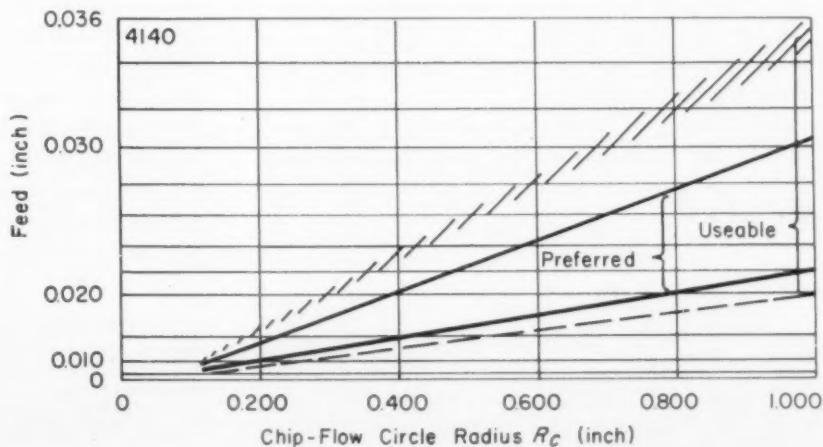


Fig. 10. Preferred and usable feed ranges as related to chip-flow circle radius R_c of clamped chip breaker. Alloy steel, annealed, 4140: 85,000—105,000 psi tensile strength, 55,000—75,000 psi yield point, 170—223 Bhn.

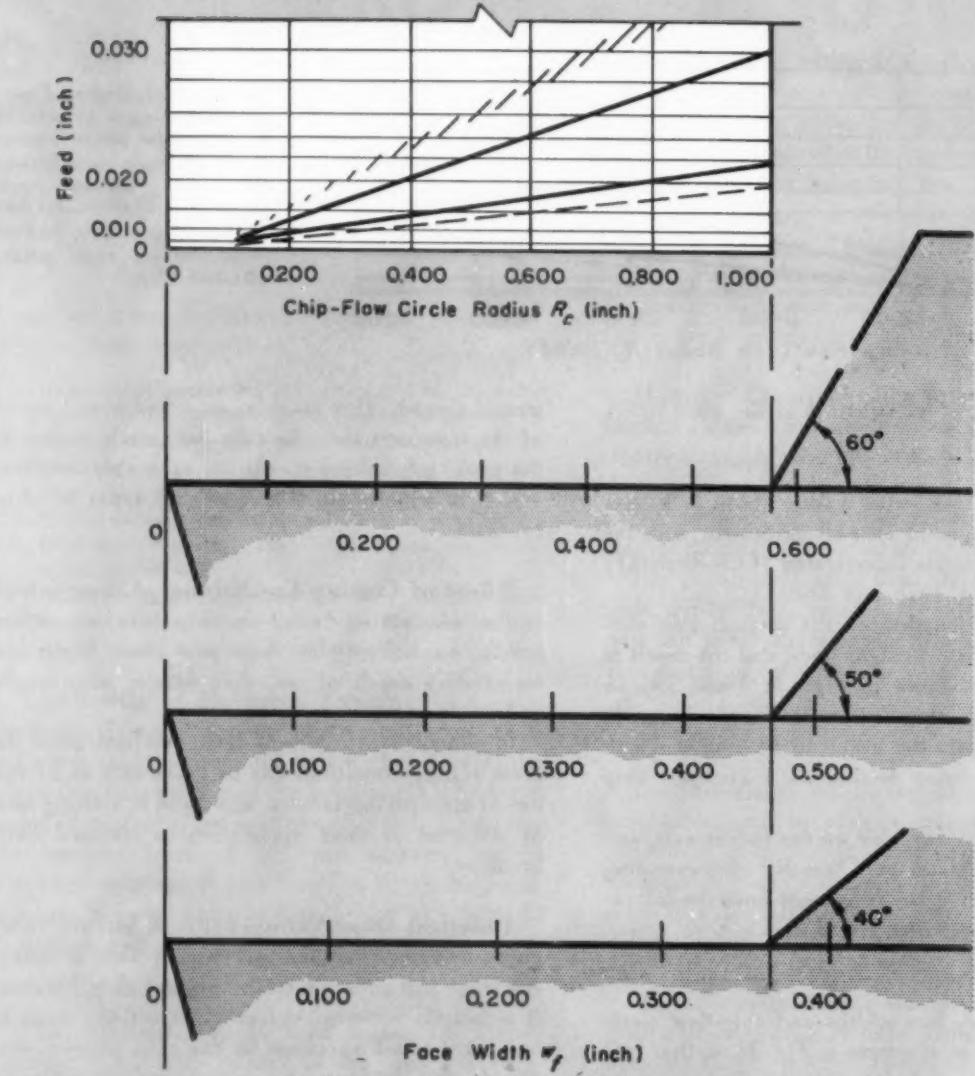


Fig. 11. Chart showing how face width for balanced design of clamped chip breaker is determined from experimental data. Face widths shown are for a chip-flow circle radius of one inch.

erratic. Best results seem to be obtained within a small interval approximately in the middle of the range, centered around the value of 50 degrees.

In any discussion of the character, performance and design of the clamped chip breaker it must not be overlooked that the success of this tool depends entirely upon the steady flow of the chip along the bevel of the block.

There are two hazards involved in this procedure: The block may shift its position, by slipping backwards under the heavy pressure from the chip, and the chip may be trapped below the bevel, in case the block is not resting solidly against the tool face.

No measurements are available as to the pressure exerted by the chip against the block. The pressure must be considerable, since blocks made of hardened high-speed steel have been worn hollow in a short time. This calls for a substantial solidity in

the design of the clamping elements, yet they have to be small in size and easy to handle for chip breaker adjustment.

Clamped chip breakers have found much wider use in Europe than in America. The reason is, probably, that there is a much tighter supply situation in European countries with respect to critical materials. There is, however, no reason why American industry should not benefit equally well from the inherent advantages of the clamped chip breaker. If tool engineers take up this challenge, they will develop a good solution. They have always done so in the past.

Acknowledgments

The author acknowledges with sincere thanks the generous support of the following in his work on chip breakers: National Machine Tool Builders' Association; Lodge & Shipley Co.; Kennametal Inc.; Wesson Co.; Viking Tool Co.; A/S Batco; D. A. Stuart Oil Co.; The Danish Steel Rolling Mill; and Dean H. Croft, University of Missouri.

Interchangeability of Stock in Die Sets

Prepared from material that will appear in Section 4, "Shear Action in Metal-Cutting," of the forthcoming ASTE Die Design Handbook.

IT IS OFTEN ECONOMICAL to use a cutting die assembly, originally designed for a specific thickness of a given metal, to pierce or blank different thicknesses of the same or different metals. The chart on the next page has been prepared to aid in selecting stock materials and thicknesses that can be cut by a specific die with known clearance. The interchangeability chart can also be used to correctly specify clearance if it is known at the time of design that the die assembly will be used for a range of stock thicknesses.

Materials are divided into three groups, with all the materials of any subdivision handled in the same way. Materials in each group are:

Group 1: All tempers 2S and 52S aluminum alloys. An average total clearance of 4.5 percent of material thickness is recommended for normal piercing and blanking.

Group 2: Aluminum alloys 24ST and 61ST; brass, all tempers; cold-rolled steel, dead soft, and stainless steel, soft. An average total clearance of 6.0 percent of material thickness is recommended for normal piercing and blanking.

Group 3: Half-hard cold-rolled steel, and stainless steel, half and full hard. An average total clearance of 7.5 percent of material thickness is recommended for normal piercing and blanking.

Because dies are ordinarily designed to the recommended average clearance values indicated, they can be used over a range of thicknesses. Total clearance ranges for materials in the three groups are, all percentages of stock thickness: Group 1, 3.4 to 6.8; Group 2, 4.5 to 9.0 and Group 3, 5.6 to 11.2.

Optimum finish of a die-cut edge depends on proper clearance, which in turn is a function of type, thickness and hardness of the work material. For clean fractures, hard metals require larger clear-

ances and permit less punch penetration than do ductile metals. The greater the clearance, the more the operation resembles drawing instead of cutting.

In ideal cutting operations, the punch penetrates about one-third the thickness of the stock before fracturing, forcing an equal thickness into the die opening. Because of plastic deformation, excessive clearance will cause large radii to be formed at the upper edges of the cut stock and the lower edges of the blank. Burrs will be formed on edges opposite the radii. Excessive clearance also results in a tapered cut edge. When clearance is insufficient, the blank does not fall clean but must be pushed through by the punch. Dull tools create the effect of insufficient clearance but with a burr on the die side of the stock.

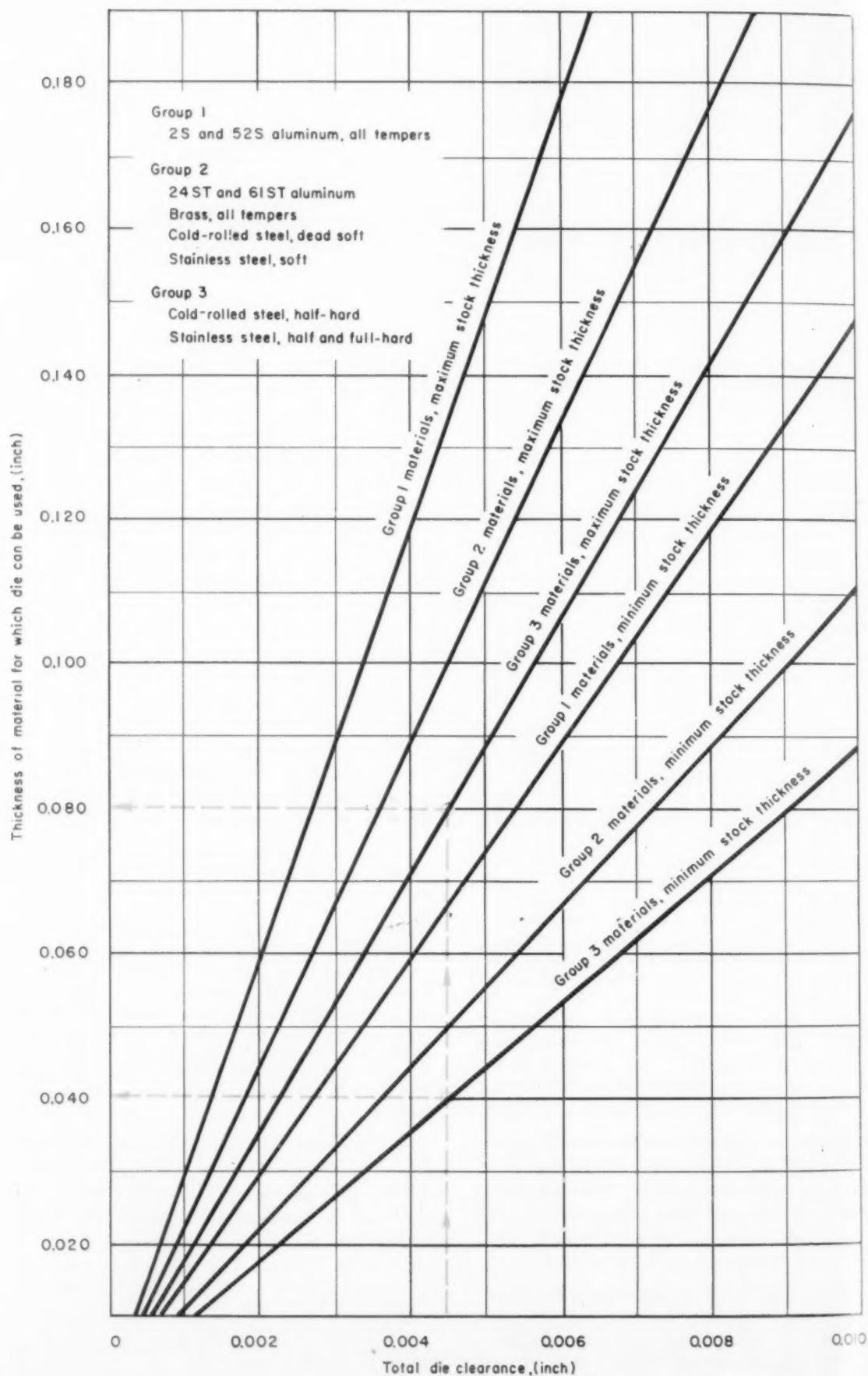
Chart lines represent maximum stock thickness with minimum clearance and minimum stock thickness with maximum clearance. Use of the chart for determining suitability of an existing die assembly for a particular material is best explained by the following example.

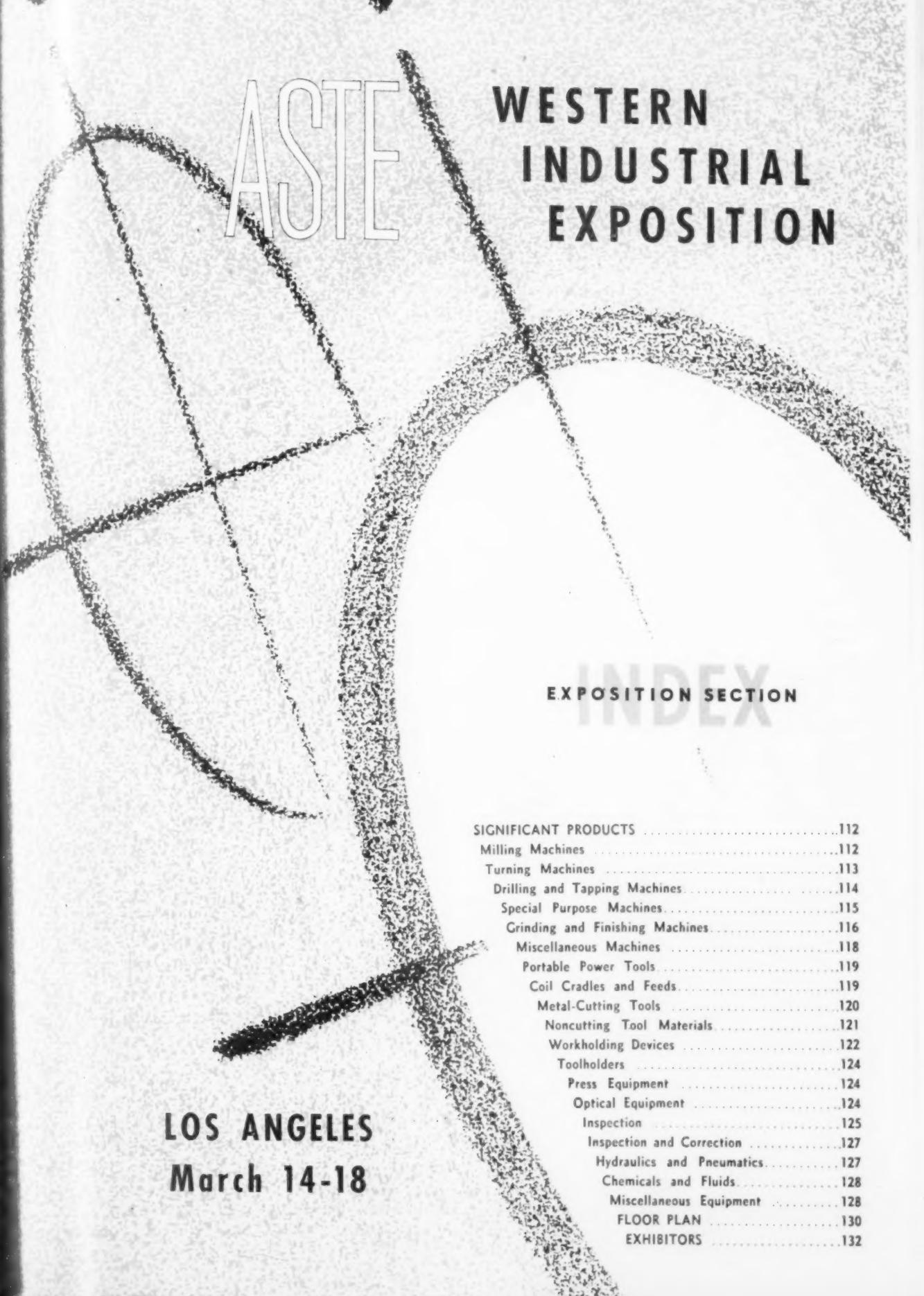
EXAMPLE: If the total clearance between the punch and die of a given die assembly is known to be 0.0045 inch, can it be used with full-hard stainless steel stock 0.062 inch thick?

SOLUTION: Since the material under construction is in Group 3, trace upward from 0.0045 inch on the horizontal scale (follow colored line) and determine intersections between this line, and the maximum and minimum lines for Group 3 materials. By tracing horizontally to the left from these two intersections to the vertical scale, the range of thicknesses for Group 3 materials can be found. Since the intended stock thickness falls within this range—0.040 to 0.080 inch—the die can be used with the proposed material.

If it is desired to design a die assembly to cover a range of material thicknesses, the chart is entered from the left. By tracing a horizontal line to the right from the minimum thickness extreme to the minimum line for the material group, a clearance value can be obtained. If a line is traced upward from the intersection to the maximum line and then to the left scale, it will be immediately apparent whether the maximum desired thickness can be handled by the same clearance.

Die Stock Interchangeability Chart





CASTE

WESTERN INDUSTRIAL EXPOSITION

EXPOSITION SECTION INDEX

SIGNIFICANT PRODUCTS	112
Milling Machines	112
Turning Machines	113
Drilling and Tapping Machines	114
Special Purpose Machines	115
Grinding and Finishing Machines	116
Miscellaneous Machines	118
Portable Power Tools	119
Coil Cradles and Feeds	119
Metal-Cutting Tools	120
Noncutting Tool Materials	121
Workholding Devices	122
Toolholders	124
Press Equipment	124
Optical Equipment	124
Inspection	125
Inspection and Correction	127
Hydraulics and Pneumatics	127
Chemicals and Fluids	128
Miscellaneous Equipment	128
FLOOR PLAN	130
EXHIBITORS	132

LOS ANGELES
March 14-18



significant products at the exposition

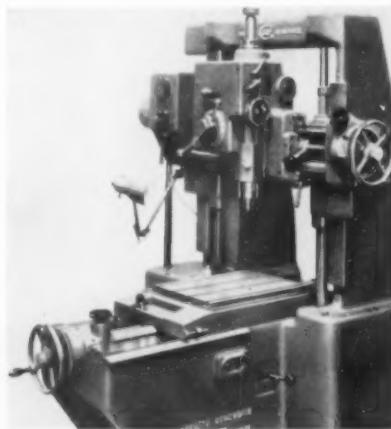
Tooling for Western Expansion, the theme for the first ASTE Western Industrial Exposition, reflects the growth of both the Society and industry in the West. A variety of significant products and developments to be shown at the Exposition is discussed in the following pages. This section serves to preview exhibits for those who plan to attend and to present an exhibit-in-miniature for those who cannot be there.

THE TOOL ENGINEER will be happy to supply names and addresses of manufacturers of any of those products mentioned if requests are made to 10700 Puritan Ave., Detroit 38, Michigan.

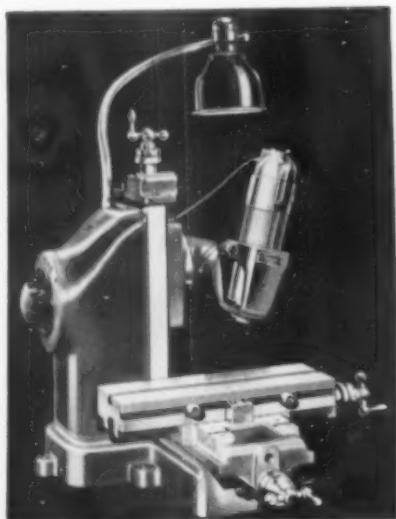
Milling Machines

Because midget workpieces generally require correspondingly small cutters, Precise Products Co. will exhibit a small, universal bench mill equipped

with a power quill capable of producing from 10,000 to 45,000 rpm at $\frac{1}{4}$ hp. A cutting speed control knob allows continuous speed adjustment. The mill is designed to produce electronic and optical components, and other small workpieces to tolerances of 0.0001 inch.



Hydroptic mill for boring and milling.



Precise mill for machining small work.

The head can be moved through 360 deg and the power quill arm through 60 deg from horizontal in either direction. Work table is 4 x 12 inches, and has standard $\frac{1}{2}$ -inch T-slots and adjustable dovetail slides. Lengths of manually actuated longitudinal and infeed travel are 5 and 3 inches respectively. Table travel is controlled by adjustable stops for duplicate operation.

A combination horizontal and vertical mill for manufacturing delicate, close-tolerance parts will be featured by the W. F. Wolf Machinery Co. Referred to as the Friedrich Deckel FP-1, this floor-mounted mill is equipped with a table which can be swiveled in three planes. To add versatility, troughs are included for mounting jig-boring equip-



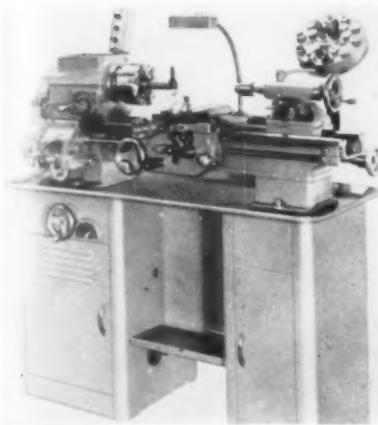
Arboga mill has a swivel head.

ment. Table is powered for both horizontal and vertical movements.

Jackson Machine and Tool Co. will exhibit a high-speed vertical mill suitable for both toolroom and production work. The mill has features not available on the company's previous models.

Three rates of speed for the power downfeed and an optional table power feed with infinitely variable speeds are available in this new model. The machine has six spindle speeds ranging from 220 to 2300 rpm and downfeed

of 0.0017, 0.003 and 0.0053 ipr. A number 40 NS taper is provided to accommodate a wide range of common collets. The spindle and motor mount are adjustable to 90 deg.



Rockwell lathe has back gear lever.

The American Sip Corp. will show their line of Hydroptic jig borers designed for jig boring and milling. A setting accuracy of 0.00015 inch is guaranteed with the Hydroptic-6 machine. Also to be shown will be the Universal Measuring Machine Type MU-214B which has a measuring accuracy for both coordinates of 0.0001 inch; and the 3-K Lead Screw jig borer with a setting accuracy of 0.00015 inch.

Built in Sweden, the Arboga EM825 vertical mill was designed by and will be exhibited by Masters Precision Tools. Comparatively low priced, this machine is powered through an eight-speed gearbox and has levers for quickly changing speeds from 125 to 1540 rpm. The hand-fed, bearing-mounted spindle has a 4½-inch travel. Longitudinal table travel is 11½ inches, cross feed, 6 inches.

An accessory power feed, exhibited

by Benchmaster Mfg. Co., has been designed to fit all the company's hand-screw mills, regardless of age. Two tapped holes are required to attach the unit. A worm and gear are driven by an independent electric motor which permits table operation independent of spindle speed. The unit is not adaptable to production mills having rack and pinion feeds.

The Samson offset boring chuck exhibited by Last Word Sales Co. is designed for heavy-duty cutting. Positive centering by adjusting the dial screw permits use of fly tools, end mills and drills without removing the chuck from the machine. Shanks and adaptors are available to fit a variety of tools and to fit any machine.

Benchmaster Mfg. Co. will exhibit an 8-inch rotary table which is larger than the company's previous models. Height dimension is 3½ inches to permit maximum use of vertical milling machine capacity. Twin ball thrust bearings in the quill eliminate backlash between worm and gear. The table is also adaptable for use on other machine tools.

Turning Machines

Exhibited by Rockwell Mfg. Co., the Delta cabinet model lathe has been added to complete the company's line of metal and woodworking power tools. A back-gear shift lever has been incorporated to avoid the need for wrenches and disengaging pins to shift from direct spindle to back gear spindle drive. Speed ranges of 44 to 1550 rpm, with an infinite choice within that range, are possible due to a variable speed drive.

The spindle, mounted in roller bearings on the inboard end and in floating



ball bearings on the outboard end, maintains accuracy under all loads and speeds. Accessories include a taper turning attachment, micrometer stops, milling attachments and a standard collet chuck.

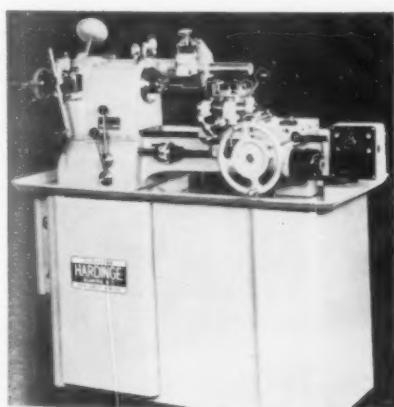
Hardinge Bros., Inc., will show the newest model HLV toolroom screw cutting lathe in actual operation. The lathe features a pushbutton variable spindle speed control and accessible controls.

The exhibit will also include the DSM59 second operation machine and the DV59 precision lathe with an extra large collet capacity. Automatic screw machines, turret lathes, chucking machines and collets will be displayed in a separate section of the same exhibit.

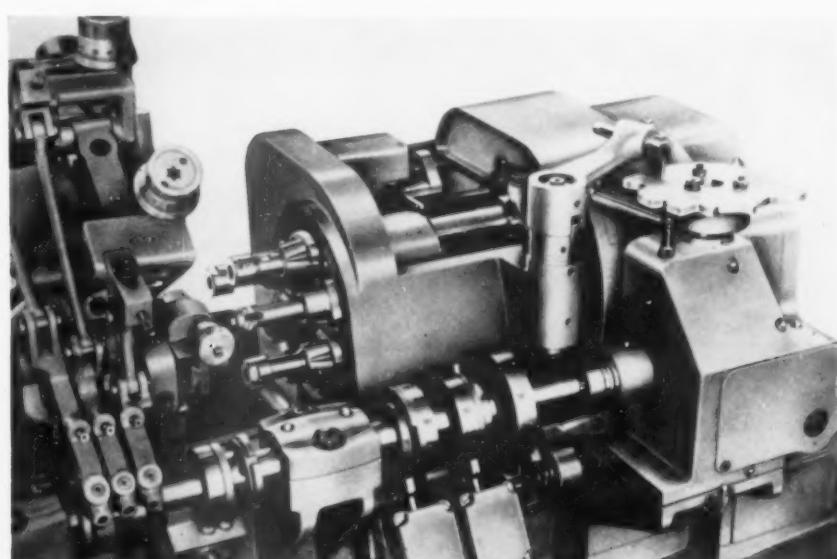
A newly designed Swiss type automatic screw machine for turning complex workpieces without second operations will be shown by the Eric R. Bachmann Co. The Gauthier GM-12 has five toolslides and six working spindles which are supported in a barrel-shaped turret. All spindles can be interchanged for center drilling, drilling, reaming, and cutting left and right hand threads.

Bar capacity is ½ inch and maximum turning length is 4 inches. The cam-shaft speeds are variable in a wide range and afford 50 different cycle times.

Model 8A-2 Hydro Drive, a hydraulic attachment for operating all ram type turret lathe slides automatically, will



Hardinge chucking machine.



Gauthier automatic screw machine has indexing turret with 6-end working spindles.

significant products

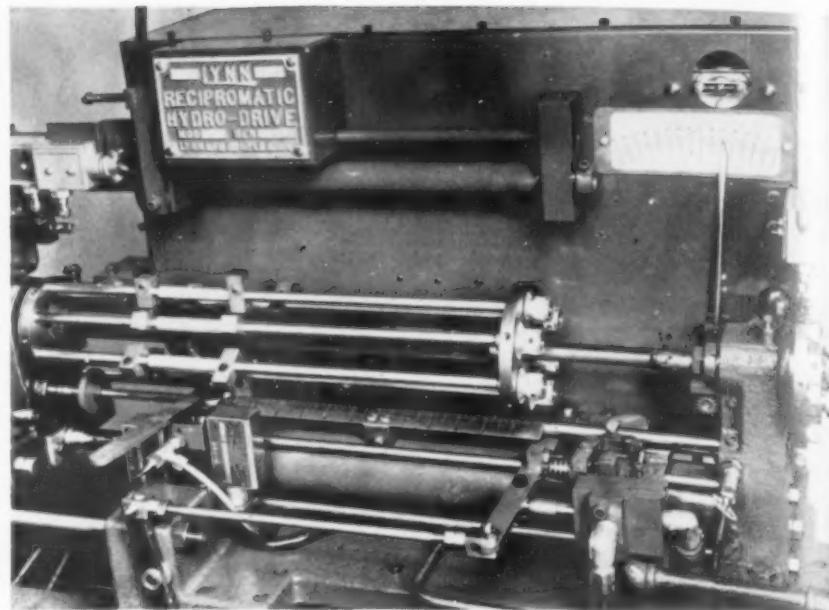
be exhibited by Lincoln Industries. The unit provides any feed rate for each station. As the turret indexes to position, the drive moves the tool at rapid travel close to the workpiece, then reduces to proper feed for that station. It may be operated continuously or stopped automatically at any or as many stations as desired. A relief valve for tapping or threading operations floats the tool into the workpiece.

Model 9-R performs all operations possible with the Model 8A-2 and, in addition, reciprocates automatically and drills unusually deep holes.

Drilling and Tapping Machines

A six-spindle, turret type radial drill will be exhibited by Burg Tool Mfg. Co. Called the 2BR Burgmaster, the machine was designed to drill bulky pieces in a short time by indexing the tools into position. One button locks the ram and column. Spindle speeds range from 225 to 3000 rpm; travel depth of each spindle is preselected. Drill capacity is $\frac{3}{4}$ inch in steel; radius is maximum 41 inches, minimum 17 inches.

Since drilling of small precision holes requires a sturdy machine, Taylor Dynamometer and Machine Co. will show its HI-EFF Series A sensitive precision bench-type drilling machine. The spindle is counterbalanced for delicate touch-feed and for a sensitive feel of the cutting action.



Model 8a-2 hydraulic drive attachment for any ram-type turret lathe.

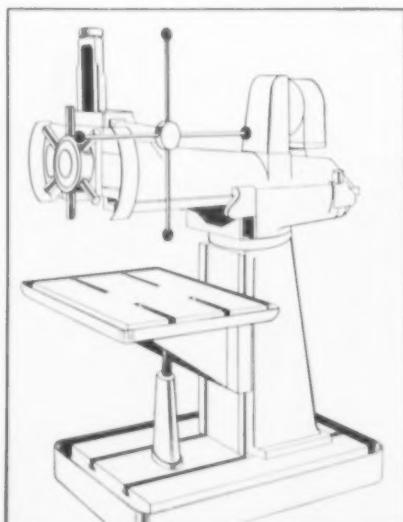
Speeds range from 800 to 10,000 rpm in steps of about 100 rpm. Speeds up to 40,000 rpm are also available. A step drilling attachment is operated by its own motor through a cam and recoil spring that provides a six-second cycle on the drill advance. Squareness of worktable with spindle is within 0.001 on a 5-inch circle. Other models will also be shown.

A drill press designed to speed production, facilitate precision drilling, and reduce operator fatigue will be shown by the Rockwell Mfg. Co. This Delta 4-inch model incorporates the features of the older machine plus new features. A self-locking depth stop calibrated to 0.002 inch with a zero start is adjustable with one hand. Worktable has clamping ledges and T-slots and can be tilted 90 deg left and right.

Electro-Mechano will exhibit their line of high-speed drill presses and drill units designed for precision drilling of small holes. The Model 105 bench drill has a quill feed which allows proper feeding of both small and large size drills. Microfeed, a method of feeding through a 4:1 reduction, provides a slow feed for drills as small as 0.004 inch. A friction-free counterbalance can be supplied for all models to replace the less sensitive spring spindle return.

Powered by electricity and conventional shop air, or a portable compressor if desired, the Dumore Co.'s self-contained automatic drill unit can be converted from drilling operations to tapping, reaming, spot facing, hollow milling, etc. The hydraulic control is separated from air circuits to reduce maintenance and minimize wear of parts.

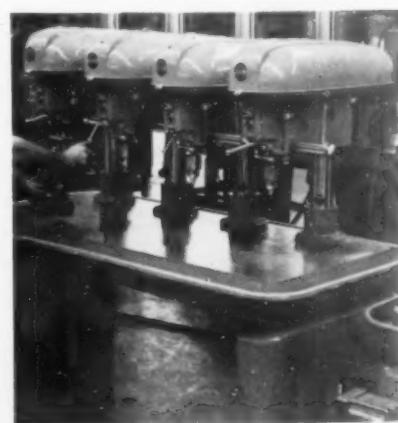
Relays, switches and valves are built in. Units can be mounted in



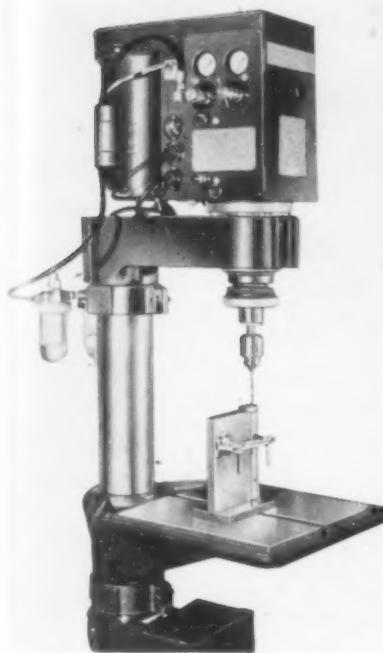
Burgmaster turret-type radial drill.



Taylor precision bench drill.



Rockwell drill presses.



Dumore automatic drill unit.

standard brackets in any combination, radial, vertical, opposed or angular. If the unit is moved, the bracket can stay in place, retaining the setup for future use. Feeds are adjustable from zero to 400 lb thrust.

Cost of automatic operations has been lowered by the Wisconsin Drill Head Co. as a result of their line of standard component parts for machines previously considered special. The first of the program, an automatic lead-screw tapping unit, will be exhibited.

Taps are protected against torque overload and end thrust in either direction by a clutch and limit switches. Maximum stroke is 4 inches, minimum $\frac{3}{4}$ inch, and leadscrew pitches range from 6 to 32. The unit can be mounted in any attitude.

Scully-Jones and Co. will demonstrate tap drivers at their exhibit. The unit features complete release, positive reset, adjustable-torque and minimum tap wear. Torque may be set to release—by turning an adjustment shell—within a percentage of breaking point. Wear is minimized and torque remains constant because there is rolling friction only when driver is engaged or released. Taps can be bottomed at high speeds without breaking.

A new principle in tool removal will be demonstrated by the company's key-hole-type ejector. The cam-action tool eliminates use of hammer, avoiding damage to spindles and bearings.

A self-contained hydraulic system is a feature of the Model 500 drill unit exhibited by the Drillmation Co. To eliminate deflection and assure smooth feed on heavy operations, the hydraulic



Hillyer automatic layout machine.

feeding thrust is applied directly behind the spindle.

The unit has reserve thrust at all spindle speeds, infinitely variable rates of traverse, positive depth control, accurate thrust control and an infinitely variable feed rate. Model 500 has a 0.0005-inch depth control and maximum drill capacity of one inch.

A drill press Air Feed accurate to 0.003 inch will be exhibited by The Walker-Turner Div. of The Kearney and Trecker Corp. The unit fits the head of any W-T type drill press up to 6-inch spindle travel. Installation time is about 10 minutes without need for machining or making electrical connections. It will not interfere with the

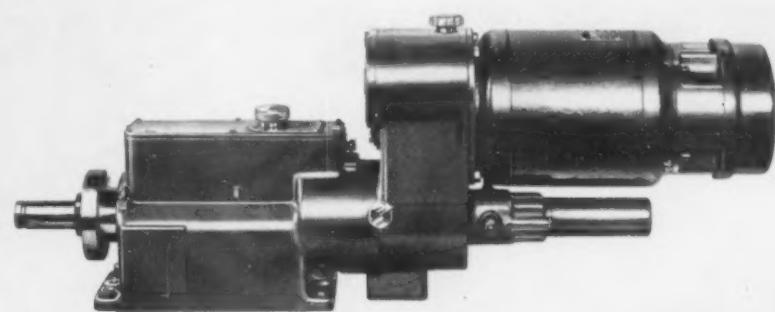


normal function, swing or position of the machine.

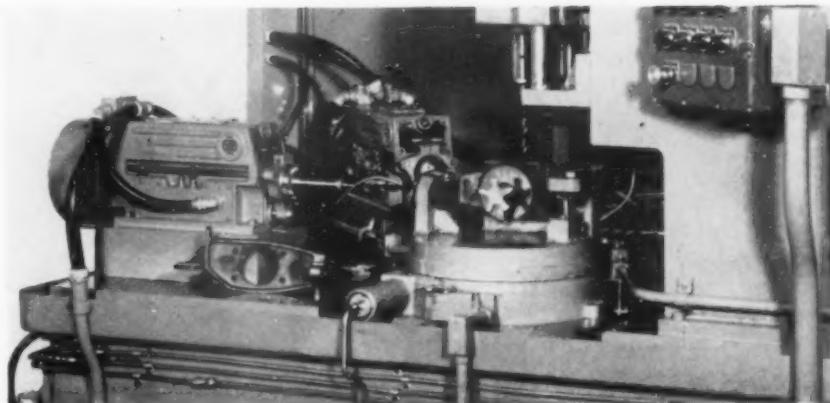
The unit does not contain hydraulic components. A pneumatic micro-valve gives the spindle the desired sensitive, automatic feed-and-retard action for a variety of continuous production operations. Feed rate may be controlled by a check valve and a series of set screw adjustments to check and slow down the spindle at several points, as well as the break-through point. Release of a valve-stop reverts the Air Feed to single cycle operation, and the removal of air cylinder plugs converts for hand operation.

Special-Purpose Machines

Manual layout of sheet steel and contoured parts can be eliminated and layout made faster by an automatic locating and drilling machine demonstrated by Hillyer Instrument Co., Inc. The model 24 will handle material up



Automatic Wisconsin lead screw tapping unit.



Drillmation units mounted on machine.



significant products

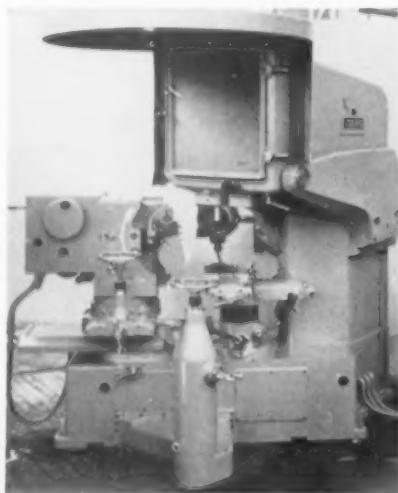
to 24 x 48 inches and has an adjustable-speed (275 to 4250 rpm) drilling unit with a 1/2-inch capacity.

Dimensions X and Y are set by the operator in increments of 0.001 inch by pressing direction controls. The workpiece is located and drilled automatically in rapid sequence.

The Elox Corp. of Michigan will exhibit and demonstrate the new M-500 Electron Drill. The machine, designed to machine intricate shapes and dies in cemented carbide after final heat treatment, uses brass electrodes. Tool life is said to be increased 200 to 700 per cent depending on the application. Costly tooling is eliminated and down time is reduced.

Featuring rugged construction for accurate service, the Gauthier gear and pinion hobber Model W1 will be shown by the Eric R. Bachmann Co., Inc. Backlash is eliminated by a worm drive device. It is not necessary for cams to be made and exchanged when changing from one gear to the next because all adjustments are made within the machine's range by exterior controls and change gears.

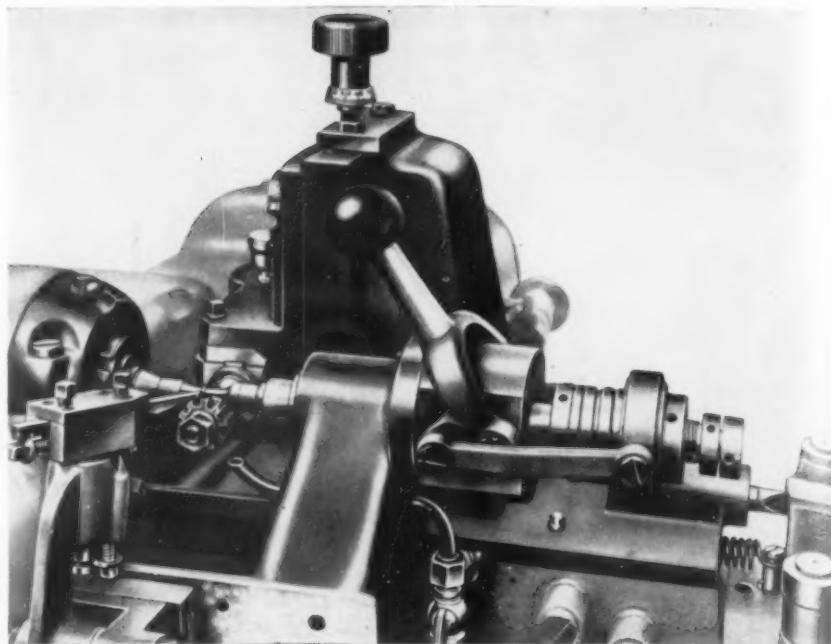
A cam-operated slide controls the right-to-left movement of the hobber



Loewe optical profile grinding machine.

during the automatic hobbing cycle and the quick-return stroke. Gear capacity range is $\frac{1}{16}$ to $2\frac{3}{8}$ inch OD and a maximum width of $1\frac{1}{16}$ inch. Gears with from 6 to 230 teeth, and diametral pitches of 32 to 170 can be cut on this machine.

The machine offers advantages such as: accuracy of tooth pitch and increased accuracy of milled tooth shape.



Gauthier precision gear hobber.

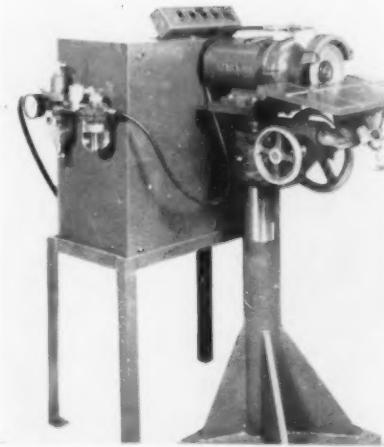
Grinding and Finishing Machines

Simultaneous grinding and inspection of form tools can be performed on the Model SP Lowe optical projection profile grinder exhibited by Eric R. Bachmann Co., Inc. Gages, flat and circular form tools, sectional dies, templates and cams can be precisely ground on this machine. The operator grinds to a line drawing of any contour projected on a glare-free shadowgraph screen.

The Bachmann Co. also plans to show a centerless grinder which has instant adjustment on the feed regulating wheel for the best feed rate for the material being ground and surface finish desired. This is accomplished by a built-in converter and a d-c motor to drive the wheel. The grinder can be used for centerless thread grinding and can be equipped with a crush dressing attachment.

Rapid stock removal with minimum wheel wear is a feature of the Hi-V carbide tool grinder exhibited by the Peck Steel and Die Supply. A special grinding wheel was developed for use on the newly developed machine. A nickel-bonded metallic wheel raises the melting point and increases wheel strength at high temperatures.

Vulcan Tool Co. will exhibit a pneumatic-powered attachment for converting jig borer machines for internal jig grinding. A shaft-mounted grinding wheel is held in a collet and adjusted with an offsetting micrometer screw. The attachment can also be used on cutter grinders, boring and duplicating mills, lathes and surface grinders.



Hi-V carbide tool grinder.

A motorized rotary table for lapping or grinding valve plates, bearing spacers and gages will also be shown by Vulcan. Rotary plates are 6 and 10 inches in diameter and are turned by a 1/4-hp air motor at speeds variable between 40 and 100 rpm. An electric motor is optional.

Because a diamond and metallic grinding wheel tends to load up, become glazed and create heat, The Wickman Mfg. Co. is exhibiting a bench grinding and lapping machine that has an efficient water pump. Water flushes the fine powder from between the diamonds and acts as a coolant. The GF-2A machine has a 1-hp reversible motor which supplies sufficient power to maintain proper cutting speeds. Spindle is directly motorized and ball bearing mounted for accurate concentricity of the diamond wheel.

Wickman will also display the

Wickman-Neven powdered-steel-bonded grinding wheel made for maximum use of the diamonds. The cutting face remains free of ridges even if abused.

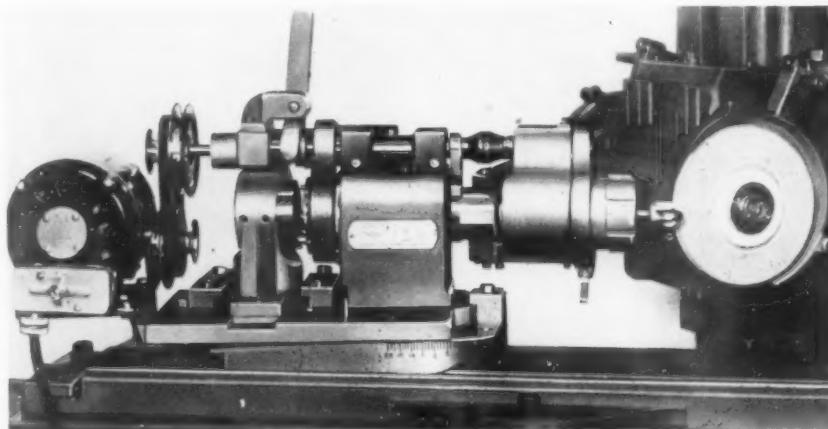
Form relief grinding can be performed on tool grinders with the improved Circularity Attachment CGA Model 500 to be exhibited by Detroit Reamer and Tool Co. Workpiece can either be held by a collet or between centers. The same relief can be ground on all tools from one setup. Cam bracket and main bearing housing are mounted on the same base for positive and simultaneous pivoting. Straight and tapered cylindrical pieces can also be ground by setting the main bearing housing and cam bracket parallel with the machine table.

A universal form relieving fixture designed to grind any combination of both axial and radial relief on cutting tools will be shown by Royal Oak Tool and Mfg. Co. Need for resharpening

Standard belts from $\frac{1}{4}$ to 1 inch wide can be accommodated.

Surface grinding equally spaced areas on workpieces can be performed accurately with the P. G. optical dividing head to be exhibited by J. Arthur Deakin and Son. Readings are made by adding the degree readings from a graduated glass annulus, minute readings on a magnified screen and seconds on a micrometer drum. The tailstock can be adjusted in horizontal and vertical planes to align the live and dead centers. Workpieces weighing 70 lbs can be ground on the head without disaligning the centers. A worm and worm wheel drive, similar to those used in mechanical heads, produce the rotary motion of the faceplate. The head can also be used for light milling operations and in inspection departments.

Hammond Machinery Builders, Inc. will also exhibit belt sanders. Designed



CGA circularity grinding attachment.

is less frequent because supporting metal is left behind the cutting edge and minimum grinding heat is generated. Setup is simplified because it is not necessary to add or remove existing parts or attachments.

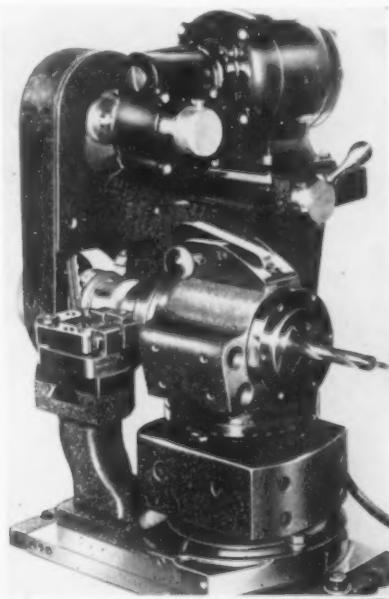
The Dumore Co.'s toolpost grinder is designed for easy mounting on the compound of lathes with a minimum swing of 20 inches. The grinder features a built-in overload protected magnetic starter and is dynamically balanced for good surface finish. A 3-hp, fan-cooled motor turns wheels up to $1\frac{1}{2} \times 12$ inches in diameter at 3450 rpm.

A belt sander for fine burring, grinding and polishing of metals, plastics and similar materials will be shown by Benchmaster Mfg. Co. Four-inch diameter belt wheels are mounted on liquid and ductproof sealed ball bearings. A $\frac{1}{4}$ -hp motor turns at 1750 rpm, providing 8000 sfm. When using a back plate, belt tension can be set by a spring and thumbscrew adjustment.

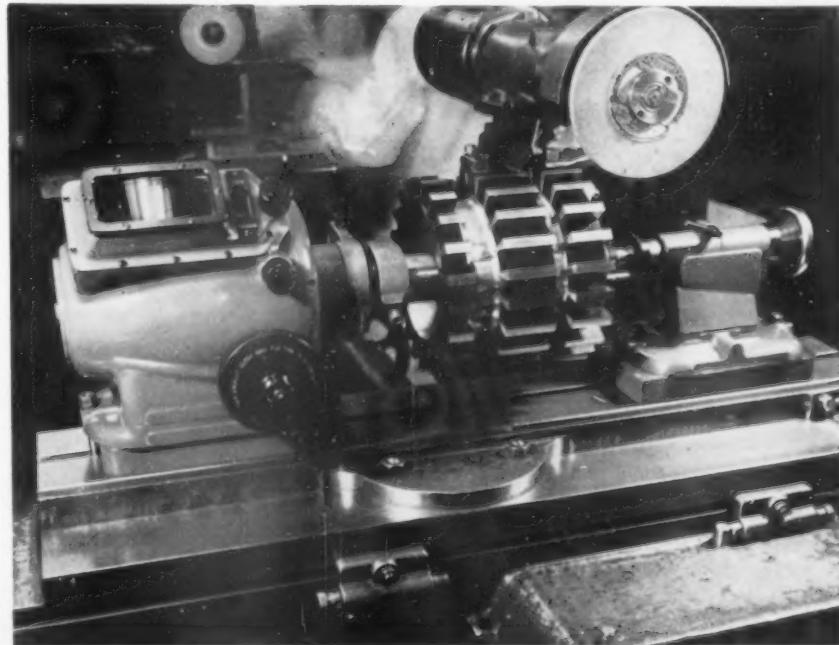


for heavy duty, the sanders can be used either vertically or horizontally and are available in both wet and dry models.

Three new models of abrasive wheel dressers for angle-tangent-to-radius dressing are to be shown by the Last Word Sales Co. featuring simple setting and adjustment. One setting will



R. O. universal form relieving fixture.



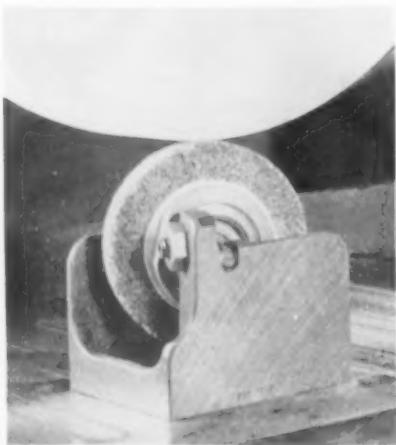
P. G. optical dividing head for toolroom grinding and milling machines.

significant products

give any two angles, as well as any set radius. Model A has a center height of 3.400 inches; center heights for Models B and C are 2.600 and 4.000 inches respectively. Each model is designed for particular wheel dressing requirements.

L. Newman abrasive wheel and steel cutter type grinding wheel dressers will be shown by Frank Loy and Associates. Dressers designed for surface and cylindrical grinders are mounted in steel stands and can be magnetically held or bolted to the machine. Hand-type models are available for bench or pedestal grinders and other models for heavy-duty snagging. Replacement wheels and steel cutters are interchangeable on all models.

Steady-rests for supporting work-pieces during OD grinding operations are to be shown by Gray-Grimes Tool Co. (Last Word Sales Co.). The rest automatically compensates for change in size caused by stock removal. This feature eliminates the necessity of cleaning up the contact area. Wheel travel is not restricted by the steady-rest.



Newman grinding wheel dresser.

A rotating grinding spindle that reaches 200,000 rpm mechanically will be shown by the Columbia International Corp., Machine Tool Div. This contact roller spindle is three spindles in one. Three pulleys run in ball bearings at speeds up to 50,000 rpm, representing normal stress on precision bearings. A differential type of drive multiplies the speed of the grinding wheel over the speed of the pulleys by a ratio of 1:4,

1:5 or 1:6 depending on the application.

A small cylinder hone to be exhibited by Sunnen Products Co. completes the range of portable hones from 1 $\frac{3}{4}$ to 20 $\frac{1}{2}$ inches. The hones can be used either vertically or horizontally. Typical applications vary from cylinders in small motors and compressors to large punch press bearings honed in tandem.

For normal work, equipment need not be dismantled when these hones are used, because the power is applied through a free floating type universal joint and therefore can be at an angle to the axis to the work.

Miscellaneous Machines

In an effort to lower the capital equipment cost of broaching, Pioneer Broach Co. will introduce their Model VM215 vertical broaching machine. The machine was designed to sell at a comparatively low price and to be adaptable to all types of manufacturing. It can be rapidly set up for surface broaching, cutting keyways, square, oblong, hexagonal and irregular shapes, and splined or round holes.

A 2-ton hydraulic pull moves the tool downward through a 15-inch adjustable stroke. Stroke and return to starting position cycle is completed in 13 seconds. Height is 42 inches and the machine requires a floor base area of 18 x 36 inches, including the cutting fluid reservoir. A method of ordering stock size and shape broaches, and components, has been established by

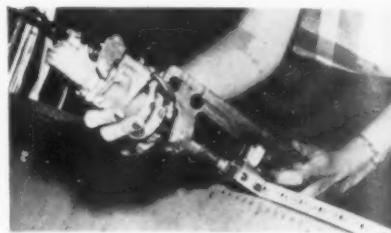


VM-215 vertical broaching machine.

Pioneer to standardize broach tool

Exhibited by the DoAll Co. will be an automatic power saw designed for rapid cutting of tough materials up to 24 inches long. Features of this saw are automatic indexing, hydraulically regulated feed pressure control, band tension adjustment and a wide-range variable speed control.

Also to be shown by DoAll is a semi-automatic powered table band machine used as part of a new technique for fast cutting of duplicate parts. This method uses fixtures which permit rapid work loading and unloading. Clamps and



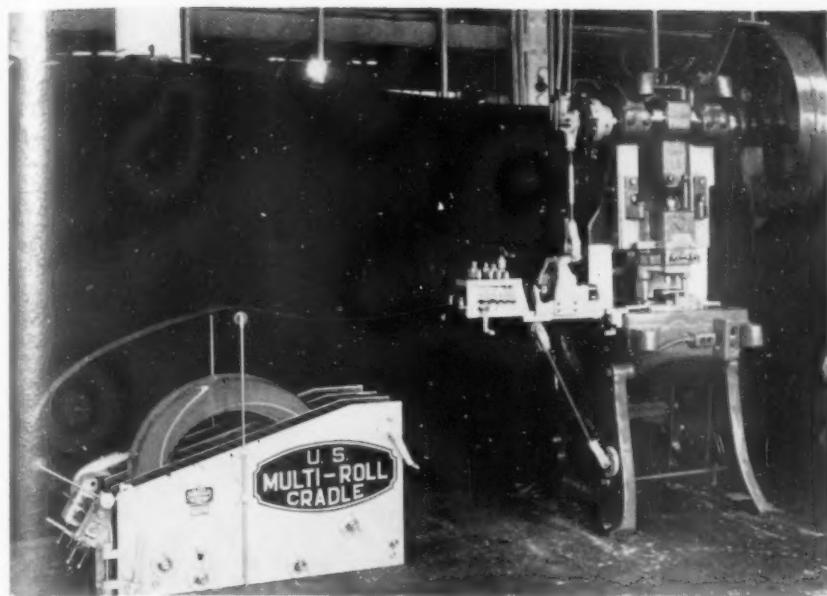
Wedgelock portable pneumatic punch.



NS-9 stud welding gun.

hold-downs are not needed. The SFP band machine which can be converted for filing and polishing will also be displayed.

A 3 $\frac{3}{4}$ -inch capacity light-heavyweight band saw welder will be shown by The Walker-Turner Div. of The Kearney and Trecker Corp. The unit has adjustable heavy duty blade clamps with cam locks and a built-in flash grinder. The 115-volt model includes a cut-off shear. Although primarily designed for portability, provision is made for attaching the welder to any metal or wood-cutting band saw.



U. S. automatic coil cradle supplying stock to feed on conventional punch press.

Portable Power Tools

An improved Model NS-9 stud welding gun exhibited by Nelson Stud Welding Div., Gregory Industries, Inc., reflects the experience and needs of customers. The gun has fewer electrical connections than previous models and greater accuracy of arc gap control. Stud capacity ranges from 10 gage pins to 1-inch diam studs. A greater range of stud lengths is possible without changing adaptors or other accessories.

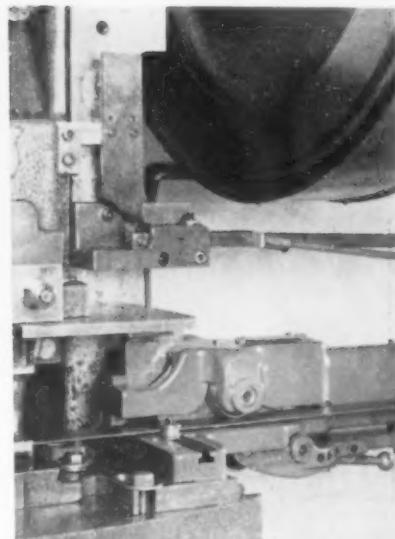
Difficult-to-drill titanium and stainless steel sheet can now be punched with the WedgeLock Company's single-punch portable unit to be introduced

at the show. This 3-ton capacity vibratory pneumatic punch saves deburring costs.

The company will also exhibit five other models with varying dimensions for reach, gap, clearance, hole size and hole spacing. A W-600 model is available for punching two rivet holes, spaced $1\frac{1}{16}$ inch apart, without changing punches or dies. All models produce burr-free holes.

Coil Cradles and Feeds

Adding to their line of pressroom equipment, U. S. Tool Co., Inc. will show the Model ACC 1-9-C automatic



Dickerman die feed.

coil cradle which feeds punch presses with sheet stock up to $\frac{1}{8} \times 9$ inches, coiled in 40-inch diam rolls weighing $\frac{1}{2}$ ton. Side frames are adjustable by hand crank to accommodate varying stock widths. The model has power-driven take-out rolls and four power-driven coil rest rolls.

A variety of cradles and feeds will be shown by Benchmaster Mfg. Co. Roll feeds are equipped with roll lifters which separate rolls slightly after each feed stroke is completed, thus releasing tension on stock between press and coil supply.

Die ribbons produced by single and progressive dies will illustrate at the show the blanking, drawing, forming and piercing operations performed with the H. E. Dickerman Mfg. Co.'s 12 types of die feeds. The Rol-Di-Feed will be mounted on a punch press to demonstrate a common installation.

An electronic timer originally designed as a time delay shut-off for coil cradles has been made available by Benchmaster for mechanical and electrical equipment. The timer is continuously variable to 10 seconds and recycles when triggered.

A heavy-duty sheet steel coil cradle designed to handle 7000-lb coils will also be shown. Coils up to 42 inches in diameter and 40 inches wide can be contained in the cradle. It operates automatically and intermittently by means of a vari-loop control or will function continuously at a selected speed by a variable speed



Sawing heavy stock rapidly with DoAll automatic power saw.

significant products

drive. Another Benchmaster model, feeds all automatic machines, and features a trip bar which sets off a motor switch as the slack loop is tightened. The motor then feeds a new loop at 90 fpm, automatically shutting off when the correct loop size is reached. Coils can be rolled into the cradle.

Metal-Cutting Tools

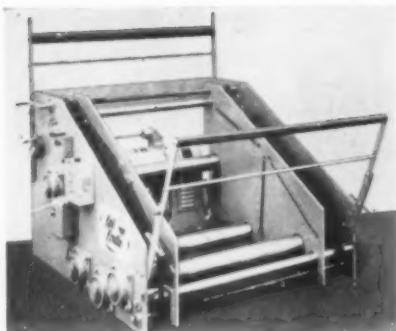
Reaming or broaching operations can now be performed with a straight-shank rotary-broach tool to be shown by the Shearcut Tool Co. Tools for cutting blind holes are made to cut within $\frac{1}{8}$ inch of the bottom. Each of two cutting surfaces performs a separate function; stock is roughed out by



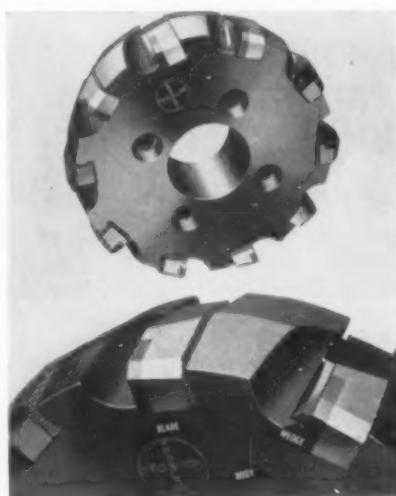
Davis boring tools with micrometers.

the front cutting edge and the final finish is produced by the shearcut edge on the helical flute which removes about 0.003 inch of stock. Any material can be cut without chatter to a tolerance of 0.0001 inch.

Ever Lock Co. taps which produce self-locking internal threads will also be shown by Shearcut. Available for shallow, deep and blind holes, these



7,000-lb capacity Koil Kradle.



Motch and Merryweather milling cutter.

taps produce a continuous curled chip due to the design and shape of the cutting edges. Class of fit—snug, medium tight, tight and extra tight—is marked on each tap.

Stub boring tools from $1\frac{1}{4}$ to 7 inches in diameter will be exhibited by Davis Boring Tool Div., Giddings & Lewis Machine Tool Co. Tools can be ordered with unfinished shanks to be turned by customer to suit requirements. A strongly built micrometer unit, accurate to 0.0001 inch, is built into each bar, eliminating cut-and-try passes.

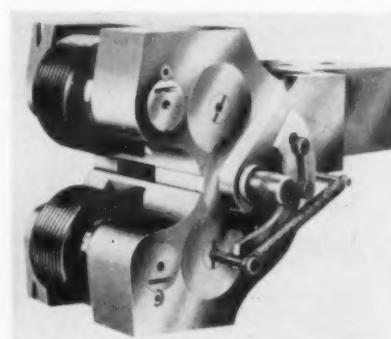
Shown in addition to these will be boxed stub sets containing general-purpose boring bars, interchangeable

blocks, heads and sleeves. Any one of four types of boring blocks can be used in the same Davis bar.

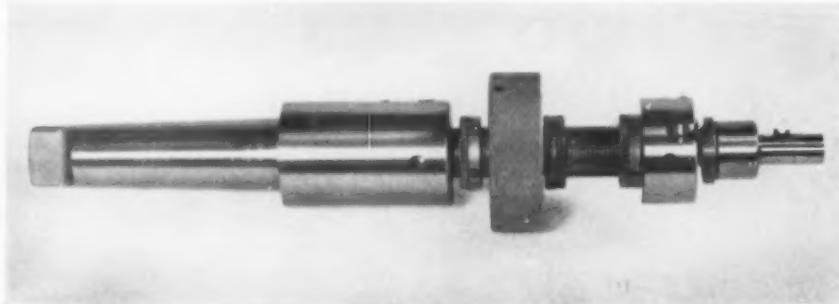
Because some milling operations require cutters having more than the standard number of teeth, the Motch and Merryweather Machinery Co. added a fine and extra fine series to its line of Kroslok face mills and shell end mill cutters. In the fine series, using standard blades, the minimum (3 inches) diameter cutters have 6 teeth; maximum (24 inches), 70 teeth. Standard blades are interchangeable within their respective bodies and in other bodies between 3 and 24 inches in diameter. Using standard blades, minimum diameter cutters in the extra-fine series also have 6 teeth; maximum, 88 teeth. Blades and wedges are a special thickness in this series and are interchangeable only within their respective bodies.

Falcon Tool Co. will exhibit a combined cutting tool and contour follower designed to simultaneously cut a form on inside and/or outside of different sized openings while following an irregular part contour. The unit oscillates as it rotates because a guide roller rides on a contoured bushing which is a scaled reproduction of the irregular contour of the part. Deburring operations inside an irregularly contoured workpiece are typical of the many functions possible with the tool.

A complete line of carbide tools and components will be exhibited by Carboloy Div. of General Electric Co. Among the items to be shown are: cemented



Landis thread rolling attachment.



Falcon tool for cutting structure at peripheries in hole of curved elements.



Piltz gear and worm gear hobs.

bide tools and various-shaped sinks, diamond dressers, thermistors, bimet, sintered and cast permanent magnets and vacuum-melted alloys.

Adamas Carbide Corp. will exhibit special premium carbide grades for applications where unusually difficult machining operations are involved. The series includes: Grade 434, for steel roughing cuts (including interrupted cuts) with heavy feeds; grade 548, an ultra hard, yet strong finishing grade capable of withstanding shock; Grade 11G, for interrupted cuts on steel where extreme shock and vibration are encountered and Grade 474, shock-resistant with more wear resistance than GG.

Two significant products will be exhibited by the Landis Machine Co.—a thread rolling attachment and the EXX Landmatic head for B and S automatics. The rolling attachment was designed for producing coarse or fine pitch threads on either automatic screw machines or lathes with power feed. Right or left-hand threads can be produced close to the shoulder.

Unlimited thread length is available for workpieces under $\frac{3}{8}$ inch diameter with the $\frac{1}{2}$ -inch Landmatic head, while a maximum of $1\frac{3}{16}$ -inch thread length is possible on larger workpieces. A floating shank with adjustable spring tension provides compensation of the feed lead in varying degrees.

A complete line of German threading, thread gaging and gear hobbing tools made especially for the optical

and instrument industries will be introduced in the United States by the Eric R. Bachmann Co. Piltz and Sohn fine pitch gear hobs fit all domestic and foreign hobs. Special worm gear hobs for any number of leads and any fine pitch have been made available. Ground thread chasers, also for close precision work, have fully ground shanks for alignment of thread and workpiece. Flat or circular internal chasers will also be displayed.

Circle R saws designed for cutting aluminum shapes and extrusions will be put on view by the Circular Tool Co. Also shown will be an expanded line of carbide-tipped slitting saws and saws made of Circoloy, developed to fill the performance gap between high-speed steel and carbide.

A quick-change press punching and gaging accessory group will be shown by Wales-Strippit Corp. The device converts an open-back press to a hole-punching machine with a 20-second punch and die change. Included in the accessory group are: steel bedplate, holder, back gage bar, stop support rail and combination auxiliary cabinet and tool rack. Contained in the cabinet is a graduated range of punch and die sizes from $\frac{1}{2}$ to $1\frac{1}{4}$ inches in diameter.

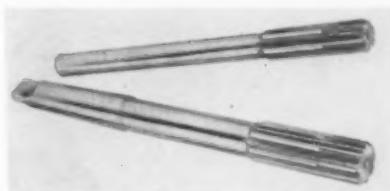
Among the mill cutters, adjustable reamers, toolposts and boring bars to be exhibited by McCrosky Tool Corp. will be a multiple operation tool. This tool simultaneously performs two or more related boring, facing, chamfering and reaming operations. The tool can be designed for specific jobs.

Boyar-Schultz Corp. will show a line of recessing tools that are available from stock. Although used primarily on B and S screw machines, they are adaptable to multiple spindle equipment if the holder used will fit the shank size of the tool.

Tools having an overall length of from $\frac{7}{8}$ to $2\frac{1}{4}$ inch are made to fit holders having $\frac{1}{4}$ to $\frac{1}{2}$ -inch holes.

Semifinished carbide reamers in a wide variety of sizes will be shown by Super Tool Co. Reductions in shop tool inventories are possible because only a limited supply of reamers is necessary. Reamers are ordered semifinished to within 0.020 of final size and finish ground by the user. Regular and long-flute types are available with either straight or taper shanks.

A carbide-tipped reamer will be shown at the Exposition by The Nelco Tool Co. This tool called the Five Star Reamer, incorporates five features: protected centers that make true regrinding easy after prolonged hard use; unequally spaced teeth permit neither vibration nor chatter; a braze which resists stress indefinitely and permits the use of harder grade carbide; extra long carbide tips to allow



Nelco carbide-tipped reamers.

more regrinds; flutes on the hardened tool steel body are hard chrome plated to create an even, over-all surface for running in guide bushings.

Super Tool Co. will show an improved line of carbide tipped drills with high speed hardened steel bodies. Large solid carbide ends afford resistance to destructively high heats generated when cutting hardened steels, extend tool life, and help eliminate breakage.

Noncutting Tool Materials

Transparent and newly developed colored grades of Epoxy laminated with fiberglass for trim shells and fixtures will be displayed by Furane Plastics, Inc. Color aids identification.

Also, foamed epoxy resins used as backup materials for cast or laminated Epoxy shells will be demonstrated. Foaming epoxy reacts and foams in place without external heat.

Plastic tools and parts manufactured from the tools will be displayed by Rezolin, Inc. The exhibit will contain parts made from epoxy laminating resins and epoxy casting resins, Dyform for stamp and drop hammer tools, phenolic tool plastic for general casting, Conform for lightweight structural forms, and parting agents.

Corrosion Chemical Co. will demonstrate the many uses in the tooling field for Kish epoxy resins. The display will indicate what tools can be made and from what grades of resins. The epoxy resins are in liquid form and can be accurately cast in contour shapes.

Developments in plastic tooling have stimulated the advance of drill bushing design for use in plastic and other castable materials. Three types of bushings will be shown by the American Drill Bushing Co.—Hexagrip, Deltagrip, and Serragrip. All are designed to prevent bushings raising, lowering or spinning while guiding drills. Bushing holes are hardened to Rockwell C61-65.

Ace Drill Bushing Co., Inc. will show



Wales-Strippit punch, gage accessory.



Furane trim fixtures and foamed epoxy.

significant products

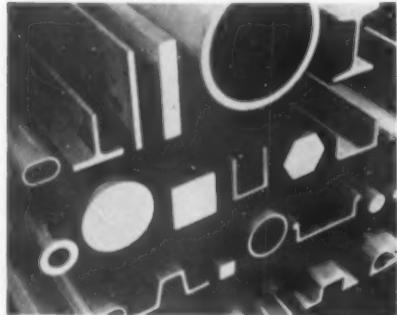
and demonstrate applications of their Ace-Lok drill bushing line for use in soft and castable materials. Bushings contain grooves to prevent turning and pulling out of resins.

Ace's lock-screw locating jig, made for accurately locating lock screws in steel or soft materials, consists of a center punch in a varied-diameter cylinder. The tool is designed to fit all ASA and Ace renewable bushings.

Plate magnesium for tooling applications will be announced by Dow Chemical Co. at the show. The low-cost plate is available in $\frac{1}{4}$ to 3-inch thicknesses in sizes up to 6 x 24 ft. Advantages of the plate are high stiffness-to-weight ratio, flatness, nonporosity, dimensional stability and alkaline resistance.

Also on display will be standard and special magnesium extrusions in a variety of sizes and shapes up to a 10-inch circumscribed circle and an 85-ft. long section.

Advantages of cast aluminum tool and jig plate will be shown at the Red Seal Metal Co.'s exhibit. Actual plate



Extruded Dow magnesium.

and bar stock will be shown plus examples of tools in use.

Plates are machined on both sides to 50 microinches, rms, and cut to a standard size of 48 x 95 inches ranging from $\frac{1}{2}$ to 6 inches thick. Flatness of plates one or more inches thick is ± 0.010 . Tensile strength is 20 to 30,000 psi; compression strength, 20 to 30,000 psi, and Rockwell hardness, 70 on the E scale.

Examples of the performance of the Latrobe Steel Co.'s new XL high-speed steels and Olympic FM high-carbon chrome die steels will be on display. The steels contain carefully controlled sulfide additives to provide self lubrication for longer tool life and to improve machinability.

A tool life test will be conducted by Joseph T. Ryerson and Son, Inc. The demonstration will show the machinability of Rycut 40 leaded alloy steel as compared to nonleaded steels in the same carbon range. The company will also display their line of steel tubing and hot rolled carbon steel bars, plates and shapes.

Two new grades of cemented carbides—CA-610 and CA-608—will be displayed for the first time by the Allegheny Ludlum Steel Corp., Carmet Div. Also to be shown are the Ottawa 60 die steel, and tool steel forgings produced in the company's Los Angeles forge plant.

Emphasis will be placed on the silver brazing alloys Easy-Flo, Sil-Fos and a flux by Handy and Harman at their exhibit. A new hardenable silver alloy which permanently holds its temper after heat treatment will also be shown. Composed of silver, magnesium and nickel, the material has a tensile strength of 70,000 psi and is available in wire and strip to thicknesses down to 0.002 inch.

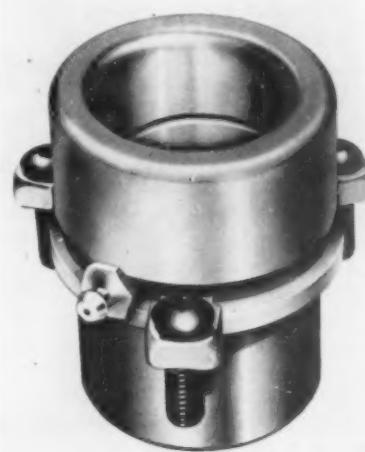
Lamina Dies and Tools, Inc. will introduce a toe-clamp-type guide pin bushing designed for standard die sets and sets on which bushings must be mounted close to the edge. A ring for retainer screws has been added to supplement the press fit into the die shoe. They are available in bronze plated hardened steel, solid steel and solid bronze.

Standard Parts Co. will exhibit their line of sure-lock fixture keys and other jig and fixture components. These interchangeable keys make it possible to put fixtures on any machine regardless of T-slot sizes. Automatic alignment is assured from top of the fixture while in place in the T-slot.

Workholding Devices

Large jet turbine wheels and disk engine disks and rings can be turned without distortion or strain when held in a special chuck to be shown by the Cushman Chuck Co. An expanding ball arbor chuck for precision second-operation internal grinding or turning will also be shown. Workpieces can often be centered to within 0.0002 inch of total indicator reading.

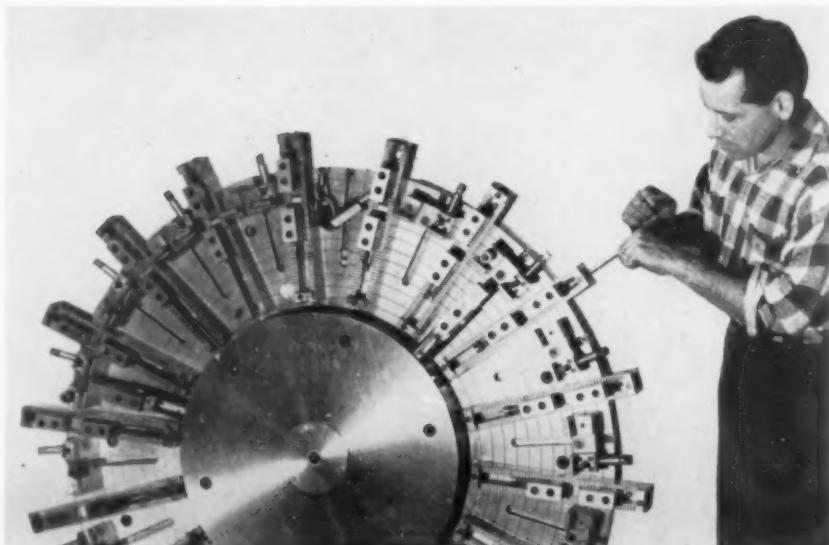
Another Cushman item consists of a



Lamina toe clamp die bushing.

2-jaw power or scroll-operated indexing chuck for holding workpieces having opposing and angular surfaces in relation to each other. The master jaws are actuated by levers and move in relation to the center of the chuck face plane.

A three-jaw air-operated chuck for automation with a guaranteed accuracy



Cushman chuck for holding jet engine disks and rings.

0.001 inch will be shown at the Exposition by the Buck Tool Co. After the jaws grip the workpiece, opposed jaws near the rear of the chuck are caused to move the chuck on an adapter bearing the workpiece into true alignment. This feature eliminates grinding the jaws in place while the chuck is mounted on the machine. To ease



Checking accuracy of Horton chuck.

setup, the chuck can be adjusted while gripping work with full air pressure.

Two new lines of chucks will be announced at the Exposition by Horton Chuck Div., E. Horton and Son Co. The Tru-Set chuck is accurate within 0.0002 inch total indicator reading. Workpieces can be aligned by a micro-screw in the chuck back. Tru-Set chucks are available with 3 or 6 jaws and 4 or 12 inches in diameter.

Both universal and independent types can be had in the Windsor chuck, and diameter sizes are 4 and 12 inches. Bodies of both chucks are fabricated of iron castings and can be had in straight recess, type L and D I American Spindle Nose Mountings.

The Model 96 collet chuck, exhibited by the Jacobs Mfg. Co., extends the use of Jacobs Rubber-Flex collets to many different machines. A conical bore in the front of the body centers the Rubber-Flex collets which are useful for holding resilient and compressible materials. Collets up to $\frac{1}{4}$

inch capacity have a runout under 0.0007 inch at the nose and no more than 0.0012 inch, 1 inch from the nose.

Brown and Sharpe Mfg. Co. will show a line of Rubber-Flex collets for their O and OG automatic screw machines. The collets eliminate need for a collet for each size round stock as each has a nominal range of 0.050 inch. A set of thirteen collets covers the spindle capacity of the machine from 0.100 to 0.750 inch. Each collet requires a chuck nut and two chuck sleeves to deliver its entire capacity range. The rubber construction provides close concentricity and gripping power, and release is instant when feeding stock. Steel inserts are imbedded in rubber, so slots are not required in the collet and the collet faces are sealed against the chuck nut.

Collets are suitable for round stock only, and for second-operation work where the length of the piece inserted in the collet utilizes the full surface. Rubber-Flex collets are made for Brown and Sharpe by the Jacobs Mfg. Co.

In addition to regular Models 1 and 2, Universal Vise and Tool Co. will introduce a small model Universal 3-way vise intended for grinding operations. Height is low, 4 inches, in flat position. Compound angles can be set quickly and held rigidly and round and odd-shaped workpieces can be cut without chatter.

Universal will also show an adjustable angle plate containing graduations for adjustment to any angle. Three T-slots for clamping workpieces and angle supporting arms are included.

An improved version of standard magnetic chucks will be shown by Ray Brown & Co. Plates are now held to the core by welding for more solid construction. Thin workpieces can be held for grinding without movement because flux strength is uniform over the face of the chuck. The chuck may be used for demagnetizing by changing from a selenium rectifier unit to 110-volt a-c current.

A clamp specifically designed to meet



requirements for riveting aircraft subassemblies will be exhibited by the Siewek Tool Co. Work is supported, located accurately to the mold line, and held firmly by the clamp for which patents are pending. The clamping unit combines a hook-clamp and part locator which minimizes obstruction to the working area and assures accurate positioning of the piece being riveted. The unit is mounted in a hole drilled through the fixture frame to allow greater machine throat clearance and better rigidity. Hook-clamp and locator can be interchangeable to correspond to the shape of the work.

New De-sta-co plier-type clamps designed for high-holding pressure and easy one-hand operation—resulting from a trigger release mechanism—will be shown at the Exposition by the Detroit Stamping Co. Hand pressure on the handles closes the clamps and similar pressure on the trigger on one handle releases the tool instantly. Pressures of 1200 lb have been exerted without benefit of handle extensions. Although heat treated, the clamps can be drilled and altered to fit specific applications.

Vlier Engineering, Inc., will exhibit Tru-Pressure torque thumb-screws that give consistently accurate end pressure. Calibrated springs maintain accuracy and simplify resetting for different end pressures.

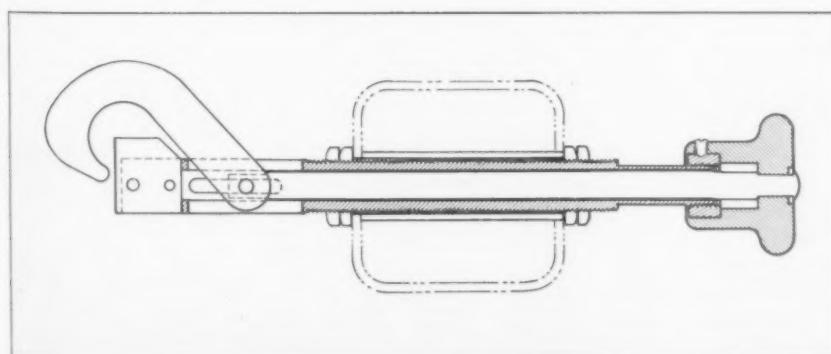
A rod centered in the screw contacts



Universal 3-way angle-set vise.

the workpiece and transmits true end pressure directly to the calibrated spring which is set to release the head for rotation at correct end pressure.

Tapered-shank turning centers with removable carbide points will be featured by the Detroit Reamer and Tool



Siewek clamp designed to meet requirements for aircraft subassembly rivetting.

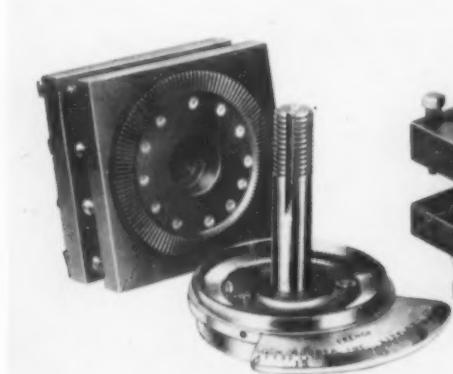
significant products

Co. Accurate to 0.0005 inch, the solid carbide points are easily removed by loosening a socket screw.

Regrinding of centers is eliminated and the carbide tips can be reground at a central location. Centers have a clearance to enable access to the workpiece and are slotted to grip the carbide.

Toolholders

Permanent replacement of old toolposts was the designers' aim in producing the Elby French turret toolholder. Exhibited by O. K. Rubber, Inc. (Marshall Tool & Supply Corp.), the holder



O. K. Rubber turret toolholder.

accurately indexes to 120 positions selected on a graduated angle dial. Four rows on each side of the four-sided turret firmly hold carbide and standard turning tools. Units can be obtained as a stock item or built to specifications.

A toolholder designed to eliminate grinding chipbreakers on turning tools will be exhibited by Vascoloy-Ramet Corp. Each V-R toolholder has a replaceable carbide plate which correctly forms the chip over a wide cutting range for single chipbreaker width.

The cutting edge of the tool is replaceable carbide. When one edge dulls, the insert can be turned to use a new edge. Other V-R products to be shown include carbide blanks, tools, dies and investment castings.

Press Equipment

A method of producing pierced parts with different hole sizes and locations in the same die will be demonstrated

at the show by S. B. Whistler and Sons, Inc. Two blank templates, one for the punch and another for the button die, are bored to admit assembly of the punch and die units.

Punches and dies are quickly removed in the press at the end of the run and the templates stored for future use. Interchangeable dies and punches for a different job can be installed on the same die set. Punches and dies are located in templates which are bored to fit the new hole sizes and locations.

Punch and die units are compact enough to fit in an area 12 x 14 inches. Units are available in round (1/32 to 3 inches diameter), oval, square and rectangular shapes. Punches are held in magnetized retainers.

Benchmaster Mfg. Co. (Marshall Tool and Supply Co.) will show a barrier-type punch press guard for use with any size or shaped die. Positions of numerous vertical guard rods can be adjusted to fit varying contours. The

hands on two buttons which send an electrical impulse to a solenoid.

A complete assortment of standard die sets and other die makers' supplies will be shown by the E. W. Bliss Co. A new integrated plant and a sales office have been established by Bliss in California to serve the West Coast.

Optical Equipment

Optical straightedges for exposing and measuring variations in surface flatness for use while machining and for final inspection will be exhibited

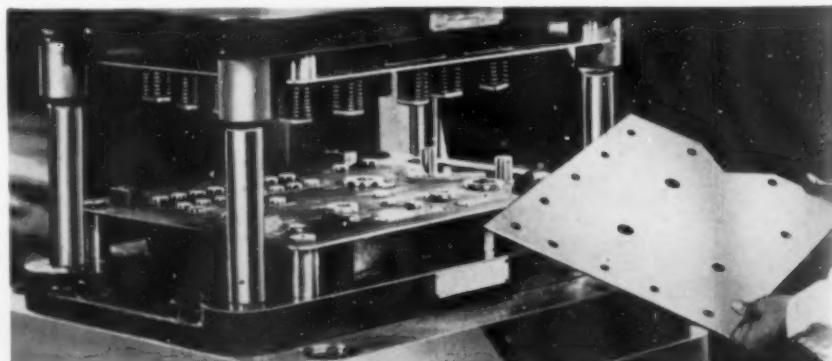


Benchmaster press safety guard.

for the first time by the F. T. Griswold Mfg. Co. Accuracy of ± 0.0004 inch is possible along a 3-ft segment.

A 2 1/4-inch diameter projection screen attached to a feeler microscope eliminates blurred vision and reading errors due to impaired vision. A stylus can be attached to the microscope to draw the surface profile on chart paper.

A method of accurately measuring recessed dimensions—difficult with a



Punches are held in magnetized retainers in Whistler multiple use dies.

height gage scribe or indicator—will be shown by the Quality Control Co. The method consists of a special 5-power microscope conventionally attached to either an 18 or 24-inch height gage.

Dimension points on wires, grooves, engravings, ordinate stations, curved surfaces and transparent objects can be checked by focusing the scope and tuning the vernier adjustment to align crosshairs on the dimension point. A circle on the reticle is provided for picking up hole centers without knowing the size. The unit can also be used as a vertical or horizontal toolroom microscope.

Newly improved jig transits and op-

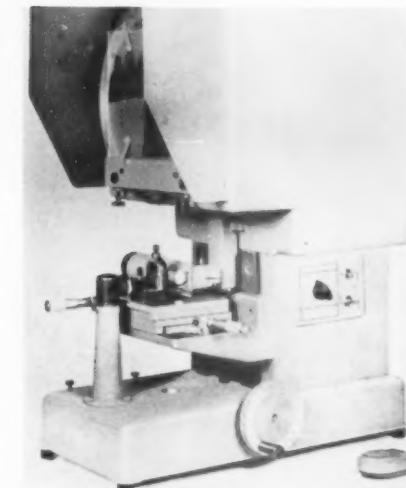
tical transit squares will be demonstrated at the show by the Brunson Instrument Co., Inc. The new versions incorporate features that enable the operator to establish and maintain a vertical plane for setting points quickly in assembly work, for gaging wear in tools and dies, and for general aligning purposes.

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Inspection

A new concept in gage design has been developed by A. G. Davis Gage and Engineering Co. by standardizing their line of flush-pin gage blanks. The purpose of the method is to reduce gage design and building costs and eliminate the need for detailing by gage designers.

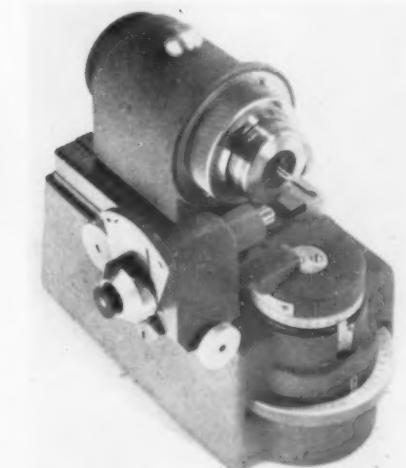
Users may choose from 13 different models of barrel-type flush-pin gage blanks and 16 models of bar-type blanks to incorporate in their gage designs. Typical combinations will be exhibited. Finish grinding can be performed by the user or by Davis.



Two-hand safety clutch.

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Model 10 optical projector.



Griswold optical straightedge.

Opto Engineering Co. will show their auto-collimator for measuring angular displacements of one second of arc. The device was designed for use by shop and inspection personnel for checking surface flatness and spindle runout, and for use as an optical comparator. Conversion tables for use with the instrument can be furnished.



Davis flush-pin gage blanks.

Dial snap gages featuring full width flat anvils and a narrow frame for close shoulder measuring will be exhibited by Boice Mfg., Inc. Snap gage Setmasters, also to be shown, can be used as a combined reference master and gaging holder for the snap gage. Setting can be done in the tool room or gage crib to gage blocks. Setmasters for the company's dial bore gages will also be exhibited.

A line of measuring instruments for dimensional control will feature the exhibit of the Federal Products Corp.



Opto auto-collimator.

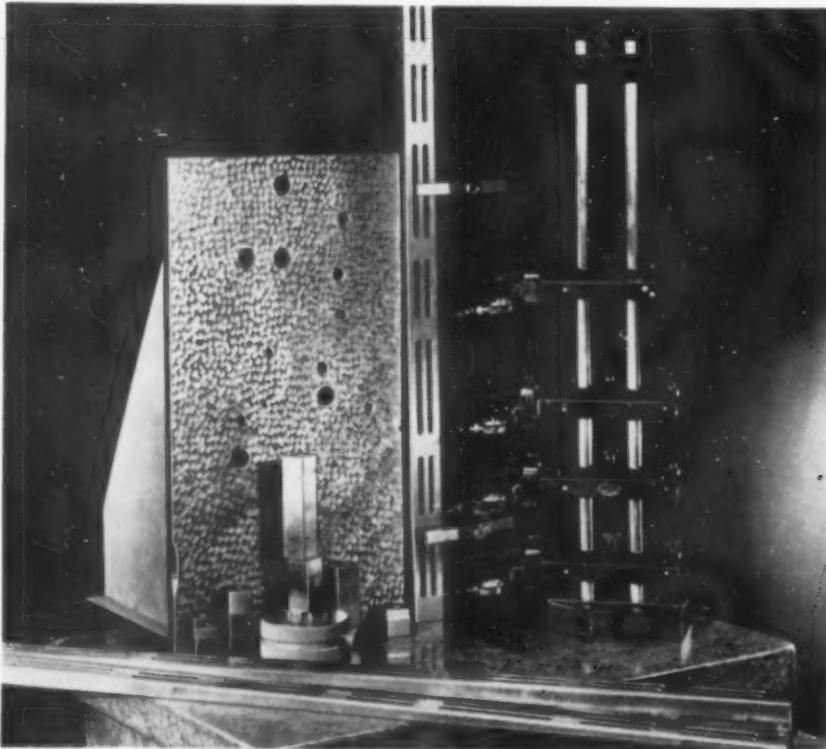


Brunson optical transit square.

significant products

Machine control gaging will be demonstrated, in which the actual size of the workpiece controls the machine or process to prevent scrapping of parts. Two series of Dimensionair air gages and their accessories will be shown, one with 2500 to 1 magnification, and another with 5000 to 1. The gages are accurate enough to utilize a calibrated scale, permitting set up with one master.

New developments in the dial indicator line consist of a waterproof indicator designed for rough use where excessive amounts of liquids and dust are present. A new dial indicator with a 2-inch range will be exhibited, as well as a new non-magnetic Testmaster for use on magnetic chucks and other fixtures where a magnetic field is present.



Multiple checking with Tietzmann gage.

Tubular Micrometer Co. will show their Tumico Sinometer, a visual gage for rapidly checking angles on workpieces at bench or machine. A hardened blade, attached to a dial indicator arm, can be preset to the correct angle on a sine bar or master angle blocks. Variations from the correct angle are shown on the indicator, graduated at 30 sec of arc per division. The gage

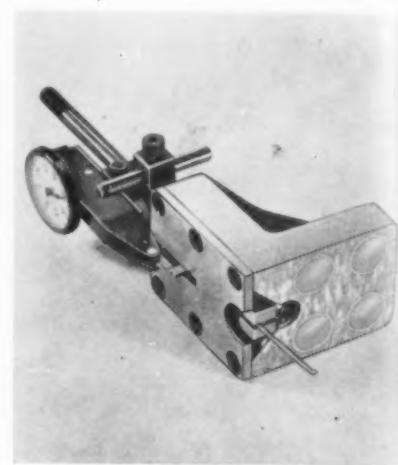
can be used as an indicating square when set at 90 deg.

A V-slot on the underside of the base can be used to inspect taper on cylindrical pieces. Adjustments are provided for horizontal measurements about 6 $\frac{7}{8}$ inches above and 2 $\frac{3}{8}$ inches below the plane of the gage base.

Height gages without numerical graduations, and an adjustable inspection block have been developed by Tietzmann Tool Co. (Marshall Tool and Supply Co.) to reduce costs by cutting inspection time. The dial indicator adaptor slides on round parallel bars mounted on an extra-wide height-gage base. Settings are made on conventional gage blocks placed on top of a round gage which can be adjusted for height. Multiple inspection of one part can be made by using several indicators on one height gage without removing scribes.

Tietzmann will also show their dial indicator die checker for quick inspection of die side walls. The gage consists of a magnetized angle plate type base which holds any standard dial indicator.

Ring gages for checking dial bases and other inside measuring devices will be exhibited by the Size Control Co. Known as the Boremaster, these inexpensive gages are made to within ± 0.0003 inch of any specified size. The exact size to four decimal places is etched on the gage.



Die Checker with magnetic base.

An ultrafine, plain plug gage with a tolerance of 0.00001 inch, designated as Class XXX, will be shown by The Van Keuren Co. This new tolerance, which is one-half of Class XX, will suit part limits finer than 0.0002 inch, and permits only 0.000010 inch total variation on the gage in sizes up to 0.825 inch diameter. Tolerances may be applied either bilaterally or unilaterally. The gage is available in chrome and carbide to avoid shallow wear depth and maintain their usefulness for measuring fine diameter variation, roundness control, surface finish, and extreme resistance to wear.

Class XXX gages are restricted to the following gage diameter ranges, materials and styles: wire type tungsten carbide from 0.010 to 0.365 inch, wire type chrome plated steel from 0.010 to 1.010 inch, taper lock chrome plated steel from 0.010 to 1.510 inch, and taper lock chrome carbide 0.365 to 1.510 inch.

A vest-pocket gage designed to measure holes 0.025 to 0.130 inch in diameter with readings within 0.0005 inch are to be shown by U. S. Expansion Bolt Co. Other models are available for larger holes.

Resembling a mechanical pencil, the Kwik-Chek can be used in one hand and gives precise, direct readings visible through a built-in crystal magnifier. A leather carrying case and steel setting gage are included.

Collins Microflat Co. will show a variety of inspection and testing equipment, which include T-slot and conventional surface plates, angle plates, parallels and straightedges. Surface plates,

urate to 0.000050 inch, are made of black granite and designed for use with parts requiring special instruments and fixtures. T-slots in the slot type plates are steel, held in place by steel inserts. Colored lights instantly indicate relative metal hardnesses on Brinell hard-



Van Keuren's ultrafine plug gages.

ness testers shown by Steel City Testing Machines, Inc. Hardness inspection can be made automatic by establishing a production method of feeding parts to the tester. Three signal lights of different colors indicate whether the part is too hard, within range, or too soft.

The company will also exhibit a new 150-kg capacity proving instrument for determining the accuracy of Rockwell type hardness testers. The source of load error can be found and compensating errors, if any, can be identified. A calibration report is supplied to convert measured deflection into kilogram loads.

A new magnetizing jig designed to increase casting inspection rates without obsoleting existing units will be shown by the Magnaflux Corp. Standard horizontal Magnaflux units can be used in a vertical position for inspecting large volumes of small parts by installing the horizontal units in the X-1584 Vertical Contact Adaptor. Parts 12 x 10 inches in diameter can be held in the unit, which clamps on rails with a lockshoe and receives power and air directly from the unit. A removable conductor which fits on the upper head is included.

The Lufkin Rule Co. will display their full line of precision tools, tapes and rules at the show. An assortment of redesigned Chrome-Clad micrometers with larger barrels, friction thimbles, ratchet caps with full or crackle finish will be highlighted.

Inspection and Correction

Extra heavy objects can be dynamically and kinetically balanced on the

Stewart-Warner electronic balancer to be shown by Merrill Engineering Laboratories. New features on the Model 708 balancer include a diametral range from one to 64 inches, remote control starter for the drive motor, a hydraulic foot brake, and choice of flat belt friction drive with variable belt speeds from 400 to 2400 fpm on surfaces up to 36 inches in diameter.

Merrill will also exhibit the Model 704, designed for smaller job type balancing, and Model 717 portable balancer for large jobs.

Taylor Dynamometer and Machine Company's Hi-Eff Universal Static balancing machines will be shown at the Exposition. These machines are designed on the plumb line principle. To protect the pivot point, the ball and stem are separated during loading and unloading. Weight capacities range from 25 to 800 lb, depending on the model.

The Rotab, a universal, rotating inspection table which permits checking of complex shapes at minimum fixture investment, will be exhibited by the Machine Products Corp. An optical micrometer microscope with a glass vernier reticle permits direct reading to 5 sec. on a graduated ring located beneath the table. The ring is marked clockwise and counterclockwise from 0 to 360 deg. The graduated ring can be rotated to the desired degree setting and clamped in position to become a fixed part of the table.

Motor power is available for both face plate rotation and angular positioning, permitting heavy parts to be inspected or machined. A pendant control box provides complete operator control by push-button pressure. Use of cone-drive double-enveloping, worm gear speed reducers for both movements provides accurate positioning of all loads. Table may be rotated at 1, 3 or 5 rpm depending on the reducer ratio selected.

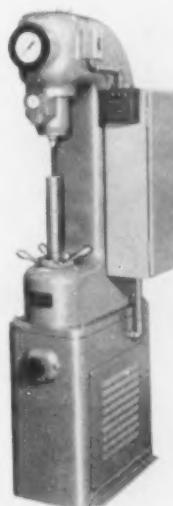
A chrome-plating gage reconditioning process will be featured at the Exposition by the Lincoln Gage Co. (Coast Tool Co.). Undersized thread, ring and cylindrical gages, and working parts can be chromium plated by the company to tolerances of 0.0001 inch. Plate is deposited without the use of con-



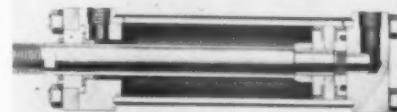
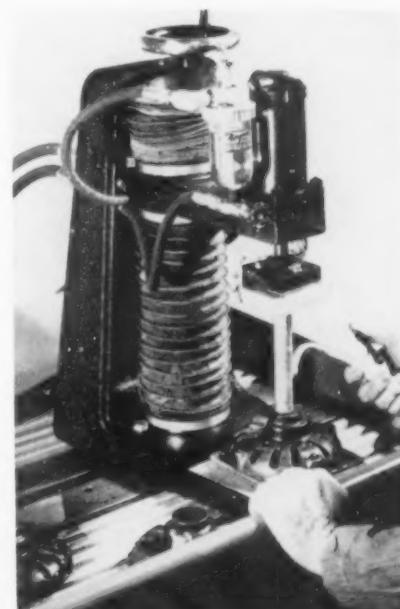
forming anodes by controlling the solution temperature, current density and immersion time.

Hydraulics and Pneumatics

Hydraulic cylinders requiring a minimum amount of space and having mounting flexibility are to be exhibited by Vickers, Inc. Space conservation is



Steel City brinell hardness tester.

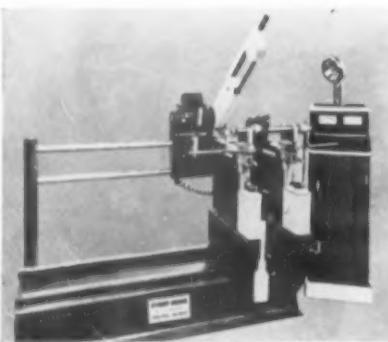


Section of Vickers hydraulic cylinder.

significant products

obtained by the use of square rod end and head end caps. A choice of five types of mountings and multiple positioning of ports and air vents, which can be rotated to any 90-deg position in relation to the mounting, makes flexible mounting possible. Adjustable hydraulic cushions on ends of the cylinder decelerate piston rod movement.

Ross Operating Valve Co. will exhibit air-control valves recently added



Stewart-Warner electronic balancer.

to their line. The compact Ross Comet 4-way solenoid valve has an operating rate of 800 cycles per min.

Series 600 hand and foot valves have single and double foot treadles and vertical or horizontal lever control. This series is well suited for machines requiring easy operation, continuous high production and compactness.

Principle advantages derived from the use of hydraulic power transmission will be shown by the Paul-Munroe Co. through a display of working models. Two of the models will consist of Gerotor hydraulic pumps and Rivett solenoid-controlled hydraulic valves mounted on subplates. The pump operates at a continuous pressure of 1000 psi at a standard design speed of 1000 rpm. Valves are 4-way and shock resistant, and are suitable for 3000 psi. The passages are large and unrestricted, allowing large flow capacity with little back pressure, friction and heat.

Galland-Henning Mfg. Company's Nopak Div. will exhibit their entire selection of air and hydraulic cylinders at the show. The display will feature several working models of items such as: Reciprotrol reciprocating control valves, Model V slide valves and Flo-Trol speed control valves.

Technical Supply Co. will show a

new development in the air-compressor field. The Nowak compressor is electrodynamic (pressure developed by vibrating piston) and does not require an air tank or electric motor. The piston strokes 3000 times per minute. Full pressure is achieved in $\frac{1}{50}$ sec after unit is energized and piston stops within $\frac{1}{50}$ sec of turning off power.

Length of the piston stroke (0.8 to 1.6 inches) is regulated automatically in proportion to the quantity of air used, eliminating the need for a regulating valve. Air pressure fluctuations are automatically controlled and an even pressure maintained by automatic control of piston travel.

The Rucker Co. will show for the first time under one name air and hydraulic units and components. Ortman-Miller push-pull cylinders, to be shown, feature small overall diameters without space consuming tie rod constructions. Also on display will be two makes of pumps and motors which provide varied hp and psi. Snap-Tite hydraulic and pneumatic quick-disconnecting couplers with built-in valves that permit flow stoppage when disconnected, will add to the Rucker exhibit. The display will also emphasize the company's complete job analysis, engineering, manufacturing, and installation service.

M-B Products Co. will feature a device for ejecting water from air lines to provide dry air in pneumatic systems. When water accumulation reaches 3 or 4 oz, it is automatically discharged in about 5 sec. Capacity is 20 gal. per hr. Weight is less than 5 lb to enable their use with plastic filter bodies. The unit is equipped with a filter bowl to prevent clogging of the air line.

Chemicals and Fluids

Removing rust and heat scale from parts on which dimensional change and acid embrittlement must be avoided can be accomplished with Rustrripper, to be exhibited by Oakite Products, Inc. The product lowers rust removal costs by requiring only three operations—alkaline soak, rinse and oil dip.

The alkaline deruster can be applied in hot or cold solutions, with or without cyanide and current. Over-immersion is not possible because removal action stops when the surface is clean.

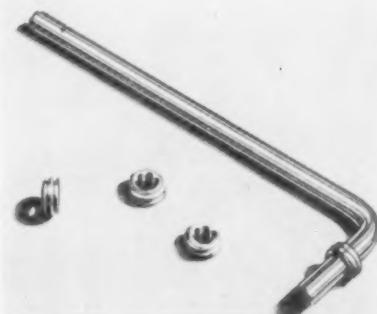
Newly added specialties of the Superweld Corp. consist of surface diffusion coating and high-temperature furnace copper brazing. Sprayed-on powdered metal diffuses into the surface during heating in a controlled atmosphere furnace. The system permits designers to select material suitable for surface protection against oxidation and corrosion.

Cincinnati Milling Products Div., Cincinnati Milling and Grinding Machines, Inc., will display a complete line of cutting fluids. The company has supplemented their water soluble fluids with the new concentrated Cimcut Base additive, which is blended in varying percentages to mineral oils for general purpose cutting. Sulphur and chlorine in Cimcut produce iron sulfides and iron chlorides which have low shear strength, lubricating the chip flow which gives better finish and longer tool life. A machine cleaner and several special water soluble cutting fluids will also be shown.

Miscellaneous Equipment

Among the bearings exhibited by the Kaydon Engineering Corp. are some designed for airborne equipment and machinery requiring lightweight, thin bearings. By making cross-sections thin, weight and space requirements are reduced to a minimum. Static capacity ratings for Kaydon bearings are based on an average stress maximum of 400,000 psi of contact area. Fatigue life capacity ratings for rotating bearings are based on a standard speed of 100 rpm and life expectancy is about 3000 hrs.

A multiple-spline through-socket setscrew developed to lower assembly time will be shown at the Exposition by the Bristol Co. A splined hole through the screw enables it to be turned from either end with an externally splined wrench. Designed for guided missile components, the screws can also be used for other setscrew applications. Screws can be hopper fed with either end up.



Bristol splined setscrews and wrench.

Safety Socket Screw Co. will introduce a screw designed to withstand loosening from vibration and prevent leakage of liquids. Hydraulic pressures up to 6000 psi can be held without leakage. These features are accomplished by a tapered shoulder and a pre-assembled lead washer. The washer locks and seals the head by forming a

dge between the side of the head and the counterbore. Led-Lok screws can be restored and reused. When used with soft alloys, screws can be fully tightened without stripping the alloy.

Machinery vibration and shock eliminators for use with all sizes of equipment is to comprise the Barry Corp.'s exhibit. Machines resting on Leveling Larrymounts are mobile, allowing flexible production layouts. Lags or cement foundations are not needed and equipment will not creep from position.

Manual shim leveling is eliminated because leveling jacks are built in. Plant noise caused by vibration is absorbed by rubber. The mounts enable placement of precision machines adjacent to impact equipment without damage to surface finishes.

The U. S. Rubber Co. will show its Power Grip Timing Belt at the Exposition. The belt operates at speeds up to 16,000 fpm. Regularly spaced rubber teeth engage in corresponding pulley grooves and produce a noiseless, nonslip, pulling action.

Nupla hammers with Nuplaflex tips, reported by one company to save \$1,391 a month, will be shown by the New Plastics Corp. The company also reports that Nupla hammers have an



Barry shock and vibration eliminator.

average longevity over composition, rawhide, rubber, fiber, laminated phenolic and lead mallets of an excess of 30 to 1. They also indicated that the hammer caused simplification of inventory and stock by discontinuing fourteen other hammer brands. Nupla hammers are non-explosive, will not chip or mushroom, and are resistant to petroleum products and common acids. Absorbent qualities produce a no-sting, no-bounce blow.

A vernier-scale draftsmen's protractor accurate to one-twelfth of a deg will be shown by The L. S. Starrett Co. The protractor lies flat on the drawing board and locks at any desired setting by means of a knurled binding nut which also serves as a pick up knob.

A 6-inch scale is marked on the straight edge, and the arc is graduated 90 deg and can be read from right or

left. Resetting is not necessary to obtain the complement of any angle. A line marker on the edge of the stock automatically forms the complement of the angle to which the protractor is set.

Since the Ordnance Dept. has a number of contract orders in the Los Angeles area, several ordnance contractors will show modern items of ordnance and present methods of tooling, some of which are unusual. These will comprise the U. S. Army Ordnance Dept. exhibit.

Unclassified: Information from the following exhibitor was received shortly before press time and could not be included under the subject headings.

The Engelberg Huller Co. will show



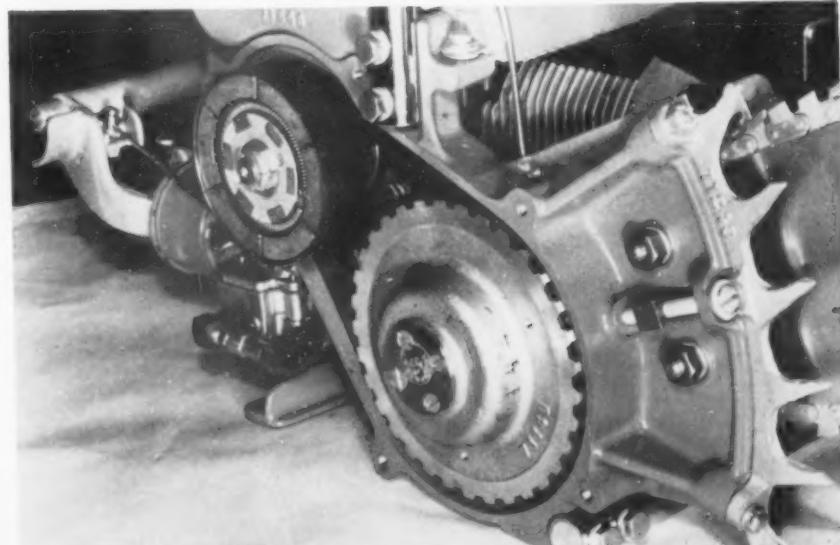
Led-Lok socket cap screw.



their Model 648 abrasive belt grinder for flat surfacing, squaring, rounding, deburring, chamfering and polishing metal, plastics, glass and wood. It is quickly adjusted to a vertical or horizontal position, or to any intervening angle. In horizontal position, long pieces overhanging the ends of the machine can be worked. The work table is adjustable to 45 deg from belt, 20 deg toward belt, and is slotted for an adjustable angle gage calibrated for any angle up to 90 deg. Belt speeds of 2800 and 4000 fpm are available with a 1725 rpm motor. Drive units are optional, and include 1 hp, 60-cycle motors in single phase at 100/220 volts, or in triple phase at 220/440 volts.



Starrett protractor with vernier scale.



Lubrication-free Power Grip rubber timing belt has teeth to prevent slipping.

John D. Gaskins

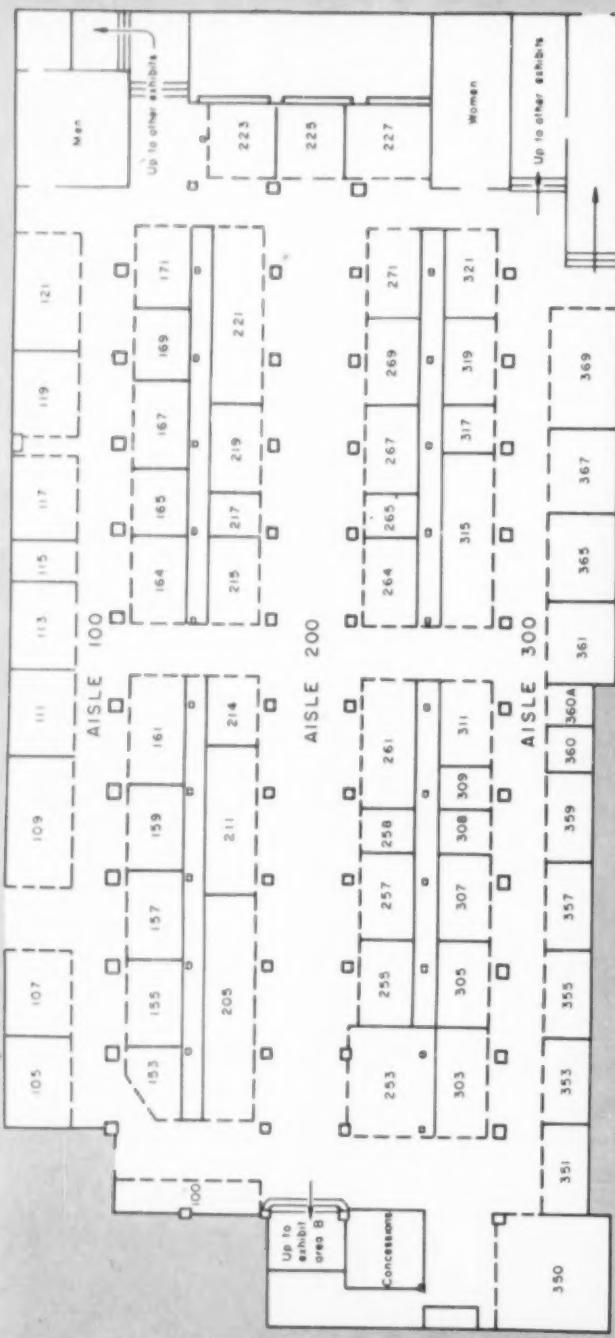


EXHIBIT AREA A

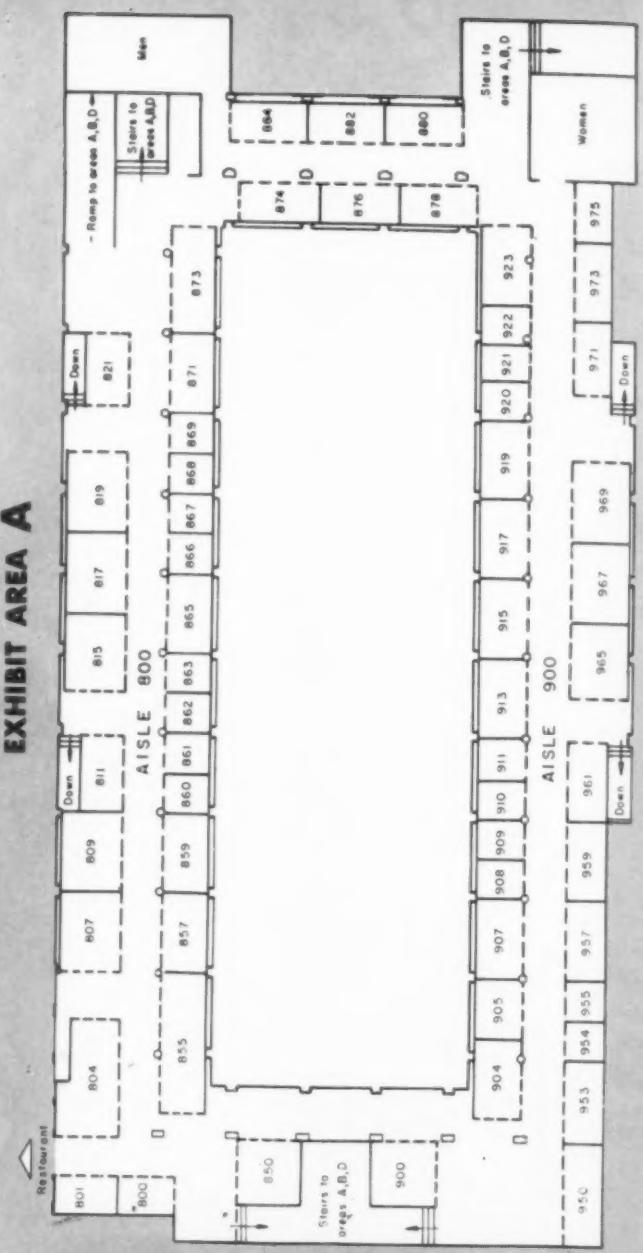
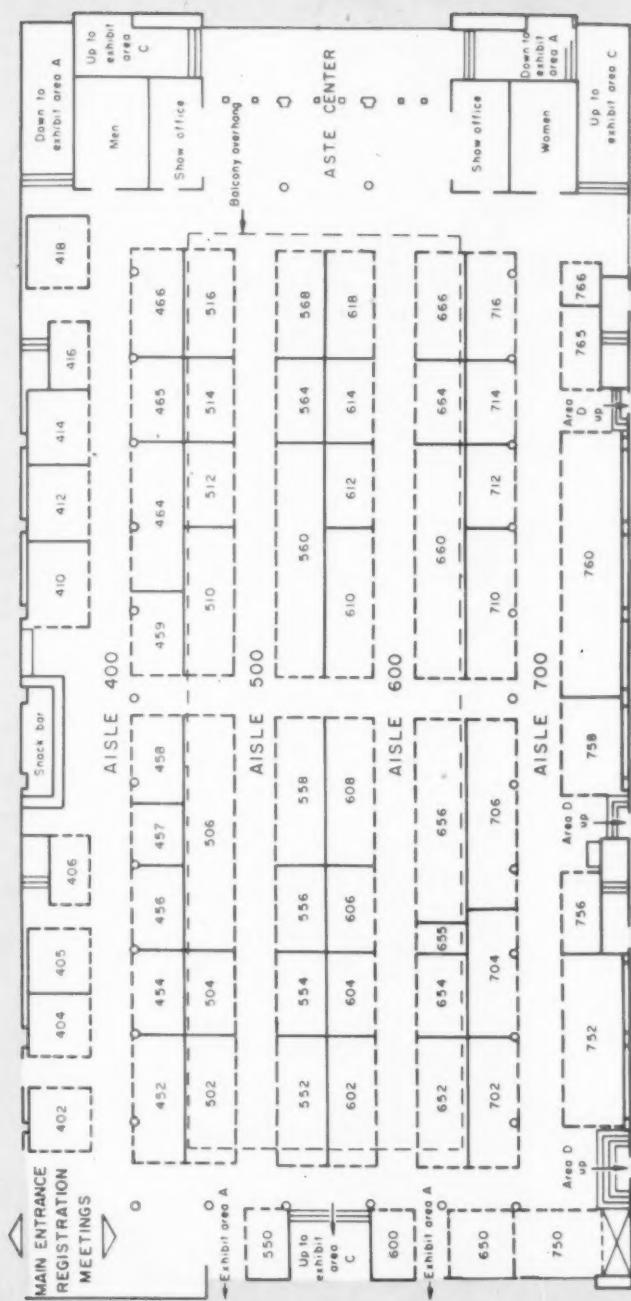


EXHIBIT AREA C

ASTE WESTERN INDUSTRIAL EXPOSITION

LOS ANGELES
March 14-18



LOCATION OF EXHIBIT AREAS

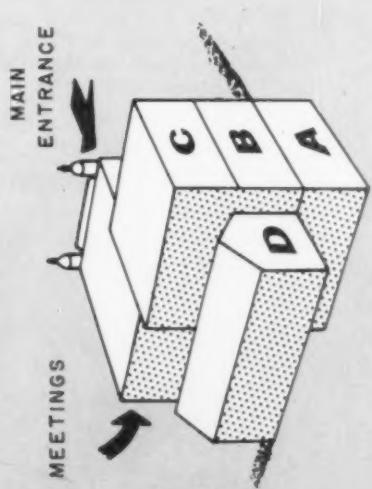


EXHIBIT AREA B



EXHIBIT AREA D

Exhibitors

and products displayed

	Booth No.		Booth No.
Ace Drill Bushing Co., Inc. 5407 Fountain Ave. Los Angeles 29, Calif. Drill jig bushings; locating jigs.	800	Almquist Bros. 2300 E. 49th St. Los Angeles 58, Calif. Micrometer dial indicators and gages; surface plates; precision checking equipment; boring and threading tools; milling cutters; carbide bit toolholders; self-opening die heads and collapsible taps; magnetic and air-operated chucks; diamond dressing tools; machine tool accessories.	602
Ace Stamp & Stencil Co., Inc. 5261 E. Washington Blvd. Los Angeles 22, Calif.	905	American Drill Bushing Co. 5107 Pacific Blvd. Los Angeles 58, Calif. Standard and special drill jig bushings; special drill bushings for use in plastic tooling.	873
Adamas Carbide Corp. Kenilworth, N. J. Cemented carbide tools, tool tips, dies, wear parts; carbide blanking and wire straightening dies; carbide wear parts and bur blanks.	317	American Pujimax Co., Inc. 2455 N. Sheffield Ave. Chicago 18, Ill. Various models of metal-cutting machines for contour cutting, beading, folding, dishing and louvering.	650
Airline Welding and Engineering 785 N. Prairie Ave. Hawthorne, Calif. Automatic longitudinal welding fixture for all welding processes.	1187	American Sip Corp. 100 E. 42nd St. New York 17, N. Y. Precision jig boring and milling machines and accessories; circular dividing tables; universal measuring machines; optical measuring and projecting machines.	1077
Alexander, George H., Machinery, Ltd. 82 Coleshill St. Birmingham 4, England Pantograph die-sinking machines; pantograph engraving machines and attachments; cutter grinders and accessories for engraving cutters; optical dividing heads; optical gaging equipment; automatic nut tapping machines; sheet metal testing units.	227	American Society of Tool Engineers ASTE Center 10700 Puritan Ave. Detroit 38, Mich. Society membership, education, research and industry services.	
Allegheny Ludlum Steel Corp. 2020 Oliver Bldg. Pittsburgh, Pa. Products made by Tool Steel, Forging and Casting, and Carmet divisions.	612	Ames, B. C., Co. 131 Lexington St. Waltham 54, Mass. Micrometer dial gages and indicators; comparators; calipers.	602
Allied Tool & Abrasive Supply Co. 3314 Fruitland Ave. Los Angeles 58, Calif. Cutting tools; end mill and tap sharpening attachments; gages; gear hob checking equipment; carbide toolholders; inserted tooth mills.	161		

	Booth No.		Booth No.
Apex Tool & Cutter Co., Inc., The	223	Boyar-Schultz Corp.	452
233 Canal St. Tool bits; carbide tools; milling cutters; railroad tools and toolholders; grinding fixture; straight and offset toolholders and tools.	Shelton, Conn.	2000 S. 25th Ave. Surface and profile grinders; screw machine tools; laps; bolts; tapping attachment; dust collector; hydraulic bar feeds; deep hole drill driving unit.	Broadview, Ill.
Arrowsmith Tool & Die Corp.	1081	Bristol Co., The	458
9700 Bellanca Ave. Dies, fixtures; special machinery; stampings; plastic tooling, draw dies, jigs and fixtures.	Los Angeles 45, Calif.	Waterbury 20, Conn. Multiple spline and socket various types screws; socket pipe plugs; keys.	
Associated Screw Products Corp.	1028	Brown, Ray, & Co.	655
223 S. Hindry Ave. Pneumatic and hydraulic equipment for all industrial purposes.	Inglewood, Calif.	516 N. London Ave. Magnetic chucks for small surface grinders.	Rockford, Ill.
Atkinson, Ralph W., Co.	660	Brown & Sharpe Mfg. Co.	560
3713 Santa Fe Ave. Pneumatic and hydraulic equipment for all industrial purposes.	Los Angeles (Vernon), Calif.	235 Promenade St. Machinists' tools and gages; electronic measuring equipment; Johansson gage blocks and accessories; milling cutters; arbors, adapters and collets; screw machine tools; chucks; shop equipment.	Providence 1, R. I.
Atlas Press Co.	568	Brown Vertical Milling Head Co.	957
1915-2023 N. Pitcher St. See Clausing Div.	Kalamazoo, Mich.	4642 Hollywood Blvd. Los Angeles 27, Calif.	
Bachmann, Eric R., Co., Inc.	402	Bruning, Charles, Co., Inc.	702
27-11 41st Ave. Optical profile grinding machine; centerless grinder; fine pitch spur gear hobbing machine; ground precision tools, including fine pitch chasers, taps, gear hobs, knurls, thread ring and plug gages.	Long Island City 1, N. Y.	855 Cahuenga Blvd. Optical tooling instruments; reproduction equipment; drafting room equipment.	Los Angeles 38, Calif.
Balas Collet Mfg. Co.	315	Brush Electronics Co.	1015
1557 E. 27th St. Conventional and master collets and feed fingers; master collet and feed finger pads.	Cleveland 14, Ohio	3405 Perkins Ave. Specialized gaging equipment: for measuring surface finish roughness; measuring and recording tension levels and variation; gage to sort metal.	Cleveland 14, Ohio
Barry Controls, Inc. (formerly The Barry Corp.)	961	Buck Tool Co.	1033
700 Pleasant St. Self-leveling machinery mount.	Watertown 72, Mass.	2015 Schippers Lane Universal scroll, and power chucks.	Kalamazoo, Mich.
Bath, John, & Co., The	161	Buckeye Tools Corp.	1000
18 Grafton St. Ground thread taps, thread and cylindrical gages.	Worcester, Mass.	5005 Springboro Pike Portable air and electric power tools: drills, reamers, screwdrivers, nutrunners, wrenches, grinders, sanders, polishers, shears and nibblers.	Dayton 9, Ohio
Behringer, A. C., Inc.	315	Burg Tool Mfg. Co., Inc.	516
334 N. San Pedro St. Die heads; collets; tapping heads; slitters, screw machine tools and holders; precision bushings.	Los Angeles 12, Calif.	15001 S. Figueria Automatic hydraulic turret drills; floating toolholders; tapping heads.	Los Angeles, Calif.
Bell Equipment Co., Inc.	704	Carboloy Dept., General Electric Co.	456
4439 Santa Fe Ave. Die tryout and production presses; cylindrical grinders; pipe bending machine.	Los Angeles 58, Calif.	Box 237, Roosevelt Park Annex Cemented carbides, tools, dies, wear parts; permanent magnets; thermistors; fabricated metals.	Detroit 32, Mich.
Bellows Co., The	1021	Chicago Rivet & Machine Co.	716
222 W. Market St. Pneumatic tools; cylinders and drill units; machine tools; air-powered feeds, clamping, holding devices.	Akron 3, Ohio	9600 W. Jackson Blvd. Tubular and split rivets; automatic feed rivet setting machines; dial feed riveters.	Bellwood, Ill.
Benchmaster Mfg. Co.	1071	Cincinnati Milling Products Div., Cincinnati Milling & Grinding Machines, Inc.	412
1835 W. Rosecrans Ave. Punch presses; automatic feeds; coils cradle; bench milling machines; vises; rotary tables; arbors; collets.	Gardena, Calif.	3018 E. Olympic Blvd. Cutting fluids; base oil additives; machine cleaners; bactericides; precision and rough grinding wheels.	Los Angeles 23, Calif.
Bliss, E. W., Co.	913		
7th and Commercial Sts. 816 N. Hollywood Way Die sets, spare parts, presses, diemakers' supplies, can making machinery, rolling mills.	San Jose, Calif. Burbank, Calif.		

Exhibitors

	Booth No.
Circular Tool Co., Inc.	602
765 Allens Ave.	Providence 5, R. I.
HSS circular metal-cutting saws; carbide saws; combination center drills; slitting saws; center reamers; commutator slotting saws.	
Clauing Div., Atlas Press Co.	115
1915-2023 N. Pitcher St.	Kalamazoo, Mich.
Heavy-duty precision lathes, drill presses, vertical milling machine, bench grinders.	
Cleveland Instrument Co.	568
6048 College Ave.	Oakland 18, Calif.
Precision gaging equipment; standard and special gages; indicators; electronic bore gage.	
Coast Tool Co.	868
3726 W. Slauson Ave.	Los Angeles 43, Calif.
6048 College Ave.	Oakland 18, Calif.
Ground thread taps; thread and cylindrical gages; single point tools and inserted blade cutters; diamond wheels, carbide grinders, tapping attachments; floating reamers; spindle parts for multiple spindle drilling machines.	
Collins Microflat Co.	907
2326 E. Eighth St.	Los Angeles 21, Calif.
Granite surface and layout plates; straight edges; parallels and angle plates; T-slotted plates; steel stands for surface plates.	
Columbia International Corp.	917
10-35 44th Dr.	Long Island City 1, N. Y.
Jigborer; layout and measuring table; toolroom lathe; turret lathe; universal cylindrical grinder; internal grinding spindle.	
Commander Mfg. Co.	100
4225 W. Kinzie St.	Chicago 24, Ill.
Multiple drilling heads; tappers; lead screw tapping attachment; chip breakers; turret heads; coolant table.	
Corrosion Chemical Co. of America	756
1881 S. Sepulveda	Los Angeles, Calif.
Plastic dies, jigs and fixtures; plastic surfaced dies; plastic products.	
Coulter Steel & Forge Co.	257
1494-67th St.	Emeryville (Oakland 8) Calif.
Graphitic tool steels, dies and parts; forgings and special steels.	
Craley, C. C., Mfg. Co.	1029
Box 12	Shillington, Pa.
Offset boring heads and tools.	
Cri-Dan Div., The, Lees-Bradner Co.	1154
12120 Elmwood Ave.	Cleveland 11, Ohio
Single-point high-speed threading, turning and boring and carbide tool lapping machines; semiautomatic threading machines.	
Cro-Plate Co., Inc., The	253
747 Windsor St.	Hartford 5, Conn.
Standard and automatic wet blast equipment; wet blast abrasives; work samples.	
Cushman Chuck Co., The	714
806 Windsor	Hartford 2, Conn.
Power and wrench-operated chucks and accessories; air cylinders; power wrenches and accessories; collet chucks; index chuck; expanding mandrel chuck; nondistorting pinch jaw.	
Dake Engine Co.	464
647 Monroe St.	Grand Haven, Mich.
Die-trypout press; shop presses; arbor presses.	
Danly Machine Specialties, Inc.	454
2100 S. Laramie	Chicago 30, Ill.
Die sets and die makers' supplies; die set bushings.	
Davis Boring Tool Div., Giddings & Lewis Machine Tool Co.	959
475 Seymour St.	Fond du Lac, Wis.
General and special-purpose boring and cutting tools; special tooling; machine tool accessories; planer tools.	
Deakin, J. Arthur, & Son	227
150-28 Hillside Ave.	Jamaica 32, N. Y.
Pantograph die-sinking, pantograph engraving machines and attachments; cutter grinders and accessories for engraving cutters; optical dividing heads; optical gaging equipment; automatic nut tappers.	
de Castro, O. F., & Associates	804
2034 Santa Fe Ave.	Los Angeles 21, Calif.
Vapor blast liquid honing and spark plug cleaning machine; ball bearing die sets; expansion reamers; universal drill fixture; punches; die buttons; automatic punch press feeds; trim dies.	
Delta Power Tool Div., Rockwell Mfg. Co.	113
400 N. Lexington Ave.	Pittsburgh 8, Pa.
Metalworking power tools and accessories.	
Detroit Reamer & Tool Co.	874
2830 E. Seven Mile Rd.	Detroit 34, Mich.
Grinding attachment; toolholder; centers; HSS and carbide cutting tools.	
Detroit Stamping Co.	404
350 Midland Ave.	Detroit, Mich.
Toggle clamps; shim and feeler stock; portable clamps; blower housings; arbor spacers; shims; stampings.	
Dickerman, H. E., Mfg. Co.	558
321 Albany St.	Springfield, Mass.
Automatic punch press feeds.	

	Booth No.		Booth No.
Dietzgen, Eugene, Co.	564	Equipment & Materials Reporter	955
1047 S. Grand Ave.	Los Angeles 15, Calif.	617A S. Brand Blvd.	Glendale, Calif.
521 Market St.	San Francisco 5, Calif.	Business publication,	
Drafting supplies; reproduction equipment; glass cloth.			
DoAll Co., The	760	Falcon Tool Co.	315
254 N. Laurel Ave.	Des Plaines, Ill.	20771 Ryan Rd. (P.O. Box 4605) Detroit 34, Mich.	
Band tool machines; surface grinders; milling machines; cutting tools; cutoff saws; saw blade; gage blocks; accessories; optical inspection equipment.		Standard and special HSS and carbide-tipped metal, cutting tools.	
Dow Chemical Co., The	809	Farrand Optical Co., Inc.	1189
1000 Main St.	Midland, Mich.	Bronx Blvd. & E. 238th St. New York 70, N. Y.	
Magnesium tooling plate and extrusions; magnesium jigs and fixtures.		Optical tooling instruments and accessories; electronic control for automatic tools, test equipment, etc. optical tools, instruments and equipment; glass and plastic targets; precision scales.	
Drillmation Co.	165	Federal Products Corp.	950
21511 John R St.	Hazel Park, Mich.	1144 Eddy St. Providence 1, R. I.	
Automatic hydraulic-feed drill units.		Electronic, mechanical, air, electric dimensional control gages for sorting, continuous measurement and other special and general uses.	
Drillunit, Inc.	465	Ferguson Machine & Tool Co.	973
3267 Wight St.	Detroit 7, Mich.	P. O. Box 191 St. Louis 21, Mo.	
Hydraulic drillunits; Geneva index table.		Cam indexing mechanisms; index tables; straight line and rotary transfer machines; special machinery.	
Dumore Co., The	758	Flynn Mfg. Co.	766
1300 17th St.	Racine, Wis.	133 Flowerdale Detroit 20, Mich.	
Automatic drill unit and drill head; high-speed drilling equipment; toolpost grinders; quills; flexible shaft tools; handgrinders.		Boring tools and accessories; thread measuring wire sets.	
Eastern Machine Screw Corp., The	315	Furane Plastics, Inc.	351
Truman & Barclay Sts.	New Haven 6, Conn.	4516 Brazil St. Los Angeles 39, Calif.	
Self-opening die heads and chasers.		Tooling plastics; laminating and casting compounds and products.	
Elastic Stop Nut Corp. of America	969	Gairing Tool Co., The	161
2330 Vauxhall Rd.	Union, N. J.	21221 Hoover Rd. Detroit 32, Mich.	
Self-locking fasteners; dowel, taper, solid or grooved-type pins.		Counterbores; pilots and holders; mill cutters; drill cutters and holders; toolholders; back spot spacing tools; block-type boring tools.	
Ellis Tool & Mfg. Co.	1071	Galland-Henning Mfg. Co.	750
712 Hickson St.	El Monte, Calif.	2753 S. 31st St. Milwaukee 46, Wis.	
Dividing head.		See Nopak Div.	
Elox Corp. of Michigan	819	General Electric Co.	456
740 N. Rochester	Clawson, Mich.	Box 237, Roosevelt Park Annex Detroit 32, Mich.	
		See Carboloy Dept.	
Emhart Mfg. Co.	171	General Pacific Corp., The	1190
See V & O Press Co. Div.		1501 E. Washington Blvd. Los Angeles 21, Calif.	
		Drill press feeds; fire-fighting equipment.	
Encyclopedia Britannica, Inc.	1160	German Machinery Co.	556
2412 W. 7th St.	Los Angeles 57, Calif.	3200 S. Garfield Ave. Los Angeles, Calif.	
Britannica publications.			
Engelberg-Huller Co., Inc.	1085	Giddings & Lewis Machine Tool Co.	454
831 W. Fayette	Syracuse 4, N. Y.	142 Doty St. Fond du Lac, Wis.	
Centerless, platen and free belt types abrasive belt grinders.		See Davis Boring Tool Div.	
Engis Equipment Co.	466		
431 S. Dearborn St.	Chicago 5, Ill.		
Automatic circular dividing machine; scale and projection units; measuring instruments; optical tooling, equipment and instruments; diamond compounds; reciprocating hand machine.			

Exhibitors

	Booth No.
Graymills Corp. 3705 N. Lincoln Ave. Coolant and circulating pumps; coolant systems; cleaning equipment; coolant manifold for multiple drill heads.	1023
Gregory Industries, Inc. E. 28th & Toledo Ave. See Nelson Stud Welding Div.	159
Griswold, F. T., Mfg. Co. 315 W. Lancaster Ave. Optical dividing head, measuring and gaging equipment.	1034
Hagemann-Nielsen Machine Co. 2328 S. Santa Fe Ave. Milling machines; tool and cutter grinding equipment.	1173
Hallwell Tool Co. 606 S. Hill St. Los Angeles, Calif.	904
Hammond Machinery Builders, Inc. 1600 Douglas Ave. Carbide tool, general purpose, abrasive belt grinders; polishing and buffing lathes; dust collectors.	1167
Handy & Harman 3625 Medford St. Silver brazing alloys; flux and anodes for silver plating; special silver alloys for electrical and electronic uses.	105
Hardinge Brothers, Inc. 1420 College Ave. Toolroom lathes; second operation, toolroom milling, chucking, turning, facing and boring machines; accessories for automatic screw machines, chucking machines and turret lathes.	506
Heli-Coil Corp. Shelter Rock Lane Screw thread inserts; lock nuts; coolant; studs and stud drivers.	410
Heller Machine Co. 114 Liberty St. Cold sawing machines; blade sharpening machines; saw blades, radial drills; milling machines.	369
Hillyer Instrument Co., Inc. 54 Lafayette St. Automatic locating and drilling machines; simultaneous multiple channel tape programmer.	1179
Hi-Shear Rivet Tool Co., The 8924 Bellanca Ave. Bushings; bolts; attachments for secondary metal-forming machines; hopper feed attachment.	319
Howell, Roger, Co. 1804 W. Olive Ave. Pneumatic-hydraulic cylinders, valves, controls; drill unit; index table; toggle press head assemblies; air couplers and hose fittings; abrasives.	309
Hudson Automatic Machine & Tool Co. 3710 Hudson Ave. Swiss type automatics; combination tool grinding and lapping machine cam tracer; cam miller.	361
Hydro-Borer Co. 1601 E. Olympic Blvd. Standard and special boring machines, heads and tools.	353
Ideal Industries, Inc. Park and Borden Aves. Live centers; marking equipment; demagnetizers; tachometers; soldering equipment; soft-faced hammers.	264
Illinois Tool Works 2501 N. Keeler Ave. Chicago 39, Ill.	161
Index Machine Co. 543 N. Mechanic St. Milling machines; rotary tables, vises; dividing heads.	712
Industrial News 373 N. Western Ave. Industrial publication; various inventions for manufacture.	355
Industrial Tectonics, Inc. 3688 Jackson Rd. Special hydraulic press for ballizing; solid and hollow precision balls in wide range of materials; precision master and tooling ball sets; ballizing sets.	1039
Inter-Lakes Engineering Co. 4845 Bellevue Ave. Display equipment; semiautomatic machinery for packaging; file and special equipment.	219
Jacobs Mfg. Co., The Drill, tap, and collet chucks.	552
West Hartford 10, Conn.	
Jamison Steel Corp. 2168 E. Olympic Blvd. Die sets and accessories; feed attachments; tool, high-speed and alloy steels; spring steels; drill rods.	654
Jarvis Corp., The Taps and tapping attachments; flexible shafts and machines; multiple tapping and drilling heads; carbide cutting tools.	602
Middletown, Conn.	

	Booth No.		Booth No.
Johnson Gage Co. 534 Cottage Grove	866	Bloomfield, Conn.	
Gages, setting plugs and rings and comparators for screw threads, including concentricity and squareness accessories.			
K.D.K. Products Co. 3008-10 Tweedy Blvd.	119	South Gate, Calif.	
Toolholders for lathes, boring mills and all automatic machines.			
Kaydon Engineering Corp. McCracken St.	859	Muskegon, Mich.	
Ball, roller and taper bearings; needles; rollers; nylon and wire retainers.			
Kearney & Trecker Corp. 900 North Ave.	614	Plainfield, N. J.	
See Walker Turner Div.			
Kenco Mfg. Co. 5211 Telegraph Rd.	1185	Los Angeles 22, Calif.	
Power presses; variable speed presses; rotary tables; milling vises.			
Kolcast Industries, Inc. 16601 Euclid Ave.	1069	Cleveland 12, Ohio	
Investment cast products; 155-lb stainless steel investment casting.			
Lamina Dies & Tools, Inc. 14925 W. Eleven Mile Rd.	811	Berkley, Mich.	
Guide pins and bushings.			
Landis Machine Co. Church and Fifth Sts.	965	Waynesboro, Pa.	
Die heads; collapsible taps; thread rolls and thread rolling attachments; chasers.			
Last Word Sales Co. 18500 Mt. Elliott Ave.	610	Detroit 34, Mich.	
Radius dressers; offset boring chuck; automatic OD steady-rest.			
Latrobe Steel Co. 3537 E. Olympic Blvd.	502	Los Angeles 23, Calif.	
High-speed, tool and die steels.			
Lavallee & Ide Inc. Grape St.	359	Chicopee, Mass.	
Reamers; reamer blanks; engraving cutters.			
Lees-Bradner Co., The 12120 Elmwood Ave.	253	Cleveland, Ohio	
See Cri-Dan Div.			
Levin, Louis, & Son, Inc. 3610 S. Broadway	267	Los Angeles 7, Calif.	
Instrument lathes and accessories; microdrill presses and micro-drills.			
Lewis, Art, Production Equipment Corp., Inc. 422 Magnolia Ave.	215	Glendale 4, Calif.	
Toggle clamps; jig and fixture components; leaf jigs; coolant pumps; resistance welders and welding supplies; valves.			
Liberty Industrial Sales, Inc. 2010 E. Seventh St.	221	Los Angeles 21, Calif.	
Taps; socket screws; drill chucks; flat stock; dowel and taper pins; belt lacings and fasteners; dressers and cutters.			
Lincoln Industries 1123 S. 7th St.	1071	Minneapolis 4, Minn.	
Hydraulic drive for turret lathes.			
Lindberg Engineering Co. 2450 W. Hubbard St.	666	Chicago 12, Ill.	
Air and hydraulic cylinders; motor generator station; melting furnaces.			
Littlejohn, Fred G., Co. 4511 Melrose Ave.	1023	Los Angeles 29, Calif.	
Coolant pumping units and cold solvent parts washers; grinders, lathes and accessories.			
Lodding Inc. 73 Beacon St.	610	Worcester 1, Mass.	
Jig and fixture components.			
Lovejoy Tool Co., Inc. 2077 Safford St.	861	Springfield, Vt.	
HSS carbide and cast alloy inserted-blade milling cutters; arbor adaptors for shell and carbide end mills; flywheels, face, shell end, special and side mills; slotting cutters.			
Loy, Frank, & Associates 2615 W. Hellman Ave.	878	Alhambra, Calif.	
Tool products; wheel dressers; live centers; welding brushes; cutoff tools; low temperature repair alloy.			
Lufkin Rule Co., The Saginaw, Mich.	550	Precision tools; measuring tapes; rules.	
M-B Products Div., Tool Sales Co. 46 Victor Ave.	909	Detroit 3, Mich.	
Automatic air line filters and lubricators; air pressure regulators; automatic air traps pneumatic grinders; pneumatic polisher.			
M.B.I. Export & Import Ltd. 475 Grand Concourse	121	Bronx 51, N. Y.	
Horizontal jig borer and boring mill; twin-slide copying lathe; radial drill; multi-purpose vises; tapping attachments; chucks and collets; arbors and adapters; vernier calipers.			
Machine Products Corp. 6771 E. McNichols Rd.	905	Detroit 12, Mich.	
Universal checking fixture.			
Machinists' Tool & Supply Co. 3690 Santa Fe Ave.	255	Los Angeles 58, Calif.	
Drills; reamers; milling cutters; counterbores, hobs; taps and dies; carbide blanks; files, saw blades; grinding wheels, air gages; toolroom items; chucks; boring heads; drill bushings; automatic drill heads.			
Magnaflux Corp. 5148 Alcoa Ave.	606	Los Angeles 58, Calif.	
Nondestructive testing equipment, instruments and supplies.			

Exhibitors

	Booth No.
Marshall Steel Co. 221 P. O. Box 108 Flat ground stock; straightedges.	904 2421 Wolcott St. Detroit 20, Mich. Chuck jaw blanks; jig and fixture components.
Marshall Tool & Supply Corp. 1071 2850 E. Olympic Blvd. Los Angeles 23, Calif. Internal collets; honing machine; inspection tools; jigs and fixtures; toolpost turrets; vises; milling attachments; production tools; broaching machines; taps; hydraulic drives; punch press; milling machines; coil cradle; drill presses.	915 1250 E. 22nd St. Euclid 17, Ohio Saw blades, cutoff blades; standard and special slitting saws; milling cutters; shell end mills; soluble oil; grinding coolant; adaptors; circular knives.
Master Chemical Corp. 1004 13 N. Huron St. Toledo 1, Ohio Cutting and grinding fluids.	975 2125 W. Mission Rd. Alhambra, Calif. Metal stampings; metal stamping assemblies; tools and dies.
Masters Precision Tool Sales 1013 3613 Archer Ave. Chicago 9, Ill. Mill with swivel-type head; gap lathe.	360 901 Sherman Denver, Colo. Diamond tools, wheels, hones, powder, lapping compound; diamond grinding quill; specially shaped diamonds for boring carbide.
McDonough Mfg. Co. 922 1500-1600 Galloway St. Eau Claire, Wis. Drill and tool grinders; tool and cutter grinders.	1018 266 Center St. Manchester, Conn. Carbide-tipped cutting tools.
Mechanical Engineering Co. 1185 8427 Foothill Blvd. Sunland, Calif. Small intricate stampings and dies; short run stampings.	159 E. 28th St. and Toledo Ave. Lorain, Ohio 5463 Alhambra Ave. Los Angeles 32, Calif. Stud welding gun; studs; applications.
Merrill Engineering Laboratories 1041 124 Lincoln St. Denver 3, Colo. Cradle-type and portable balancers.	457 13-19 University Pl. New York 3, N. Y. Engravograph.
Merz Engineering, Inc. 164 200 S. Harding St. Indianapolis, Ind. Electronic comparator; other gaging equipment and ball-bearing sorting machines.	418 1026 N. Sycamore Los Angeles 38, Calif. Soft-faced hammers; mallets; drive punches; flexible oilers; soft-faced hammer adapter for rivet guns.
Metal Removal Co. 908 1546 N. Orleans Ave. Chicago 10, Ill. Abrasive wheels and accessories; carbide burrs, files and end mills; HSS end mills, die sinkers and rotary files.	954 New Standard Div., U.S. Expansion Bolt Co. York, Pa. Precision hole gages; speed reduction units.
Milford Rivet & Machine Co., The 1131 857 Bridgeport Ave. Milford, Conn. Fasteners; rivets; rivet-setting machines.	211 Nichols-Morris Corp White Plains, N. Y. 76 Mamaroneck Ave. Twin mills; semiautomatic miller; toolroom miller; standard miller.
Miller Fluid Power Co. 205 2040 N. Hawthorne Ave. Melrose Park, Ill. Air and hydraulic cylinders; booster accumulators and reciprocating boosters.	750 Nopak Div., Galland-Henning Mfg. Co. Milwaukee 46, Wis. 2753 S. 31st St. Air and hydraulic cylinders and valves.
Modernair Corp. 406 400 Preda St. San Leandro, Calif. Pneumatic and hydraulic cylinders; valves; controls and special fluid-power devices.	1071 O.K. Rubber, Inc. Littleton, Colo. 501 Rio Grande Ave. Manual and self-indexing turret toolholder; boring bar and cutoff tool adapters.
	880 Oakite Products, Inc. Los Angeles 12, Calif. 1000 E. First St. 681 Market St. San Francisco 5, Calif. Production cleaning and metal-treating materials equipment and processes.

	Booth No.		Booth No.
Ohio Crankshaft Co. 3800 Harvard Ave. See Tocco Div.	414	Portage Double Quick Tool Co. 1033 Sweitzer Ave. Quick change tools; carbide cutoff tools; internal comparator; boring tools; horizontal milling and boring machine; rotary indexing table; angle plates.	109 Akron, Ohio
Oldham, R. P., Co. 6399 Wilshire Blvd. Milling machines; surface grinder; jig borer; universal steel worker; steel saw; radial drill.	367	Precise Products Corp. 1328 Clark St. Portable electric grinder millers; electric power quills, bench milling machines; high-speed rotary tools.	821 Racine, Wis.
Optical Gaging Products, Inc. 26 Forbes St. Chart gages and chart layout materials; fixture bases and staging fixtures for optical comparators; template filer; dual image fixtures; cam checkers; punch and die checker; gear analyzer.	514	Precision Tool Sales 417 E. Florence Machine tool accessories; jig and fixture components; precision tools; gaging and inspection instruments; cutting tools, coolants; designer's aids.	610 Los Angeles 3, Calif.
Opto Engineering Co. 3524 W. Washington Blvd. Electro-mechanical and optical checking and test equipment; electronic test equipment; comparator charts.	1155	Procurier Safety Chuck Co. 18 S. Clinton St. Tapping attachments; tapping and threading heads; chucks and collets; accessories.	315 Chicago 6, Ill.
Ordnance Corps, United States Army San Francisco Ordnance District 1515 Clay St. Ordnance items; demonstrations of special tooling.	348	Quality Control Co. 1566 N. Western Ave. Inspection equipment including measuring instruments, gages, comparators, testers, surface plates, precision tools, height gage scope.	882 Los Angeles 27, Calif.
Pafenbach, C. A., & Co. 327 E. Sixth St. Cutting tools.	359	Racine Hydraulics & Machinery, Inc. 2000 Albert St. Hydraulic pumps, valves; pressure boosters and hydraulic power units.	660 Racine, Wis.
Paul-Munroe Co., The 4865 E. Gage Ave. Air and hydraulic cylinders; hydraulic motors, valves and pumps; power units; pressure gages; solenoid valves.	971	Rankin Bros. Engineering & Sales, Inc. 11090 S. Alameda St. Disk grinders; disk cement.	865 Lynwood, Calif.
Peck Steel & Die Supply, Inc. 4436 Long Beach Ave. Cerro alloys; punches, dies and retainers; tool steels; hitch and die feeds; carbide tool grinder and metalloid fluids.	558	Ready Tool Co. 550 Iranistan Ave. Machine tool accessories.	1023 Bridgeport, Conn.
Penton Publishing Co. 1213 W. 3rd St. Steel, Foundry, Machine Design, New Equipment Digest, Automation; Technical books.	1036	Red Seal Metals Co. 10035 Burts St. Cast aluminum tool and jig plate and bar stock; cast aluminum plate tooling.	311 South Gate, Calif.
Pfauter Machine Co. 4639 Washington Blvd. 3206 Fairfield Ave. Gear hobbing machines.	1177	Reliant Industries 4947 Firestone Blvd. Gages; tooling balls; gage blocks; monochromatic lights; optical flats; thread and gear wires.	855 South Gate, Calif.
Pioneer Broach Co. 6434 E. Telegraph Rd. Broaches; broaching machines, fixtures and gages.	910	Rezolin, Inc. 5736 W. 96th St. Tooling plastics; plastic tools and parts; raw materials.	923 Los Angeles, Calif.
Pioneer Tool Engineering Inc. 1601 E. El Segundo Blvd. Fabricated tools; cast aluminum tooling material and products.	269	Richards, J. A., Co. 903 N. Pitcher St. Multiform benders for flat, rod or tubular materials.	1019 Kalamazoo, Mich.
Pipe Machinery Co. 2910 Lakeland Blvd. Carbide solid thread ring gages; plug gages; thread checkers; pipe, oil country, cylindrical gages.	855	Rimat Gage Co. 21 W. Dayton St. Gages; internal thread comparators; inside micrometers.	860 Pasadena 2, Calif.

Exhibitors

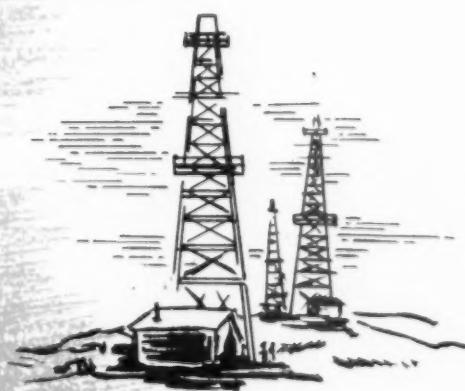
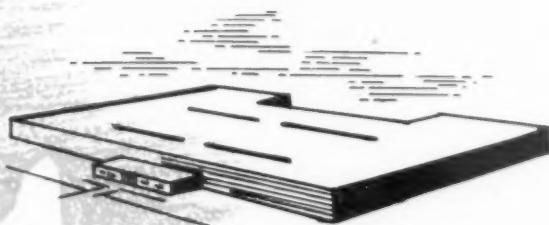
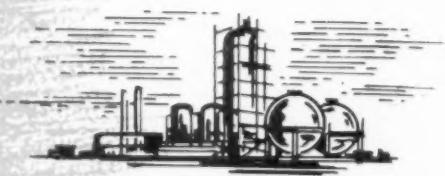
	Booth No.
Rockwell Mfg. Co. 400 N. Lexington Ave. See Delta Power Tool Div.	113
Ross Operating Valve Co. 120 E. Golden Gate Ave. Operating valves for air, vacuum and hydraulics; pilot valves.	660
Rotex Punch Co., Inc. 2350 Alvarado St. Milling machines; planer; turret punch presses; miniature press brake; air valves, cylinders and clamps.	157
Royal Oak Tool & Machine Co. 29800 Stephenson Hwy. Dies; fixtures; grinders, accessories and equipment; machine tools; toolroom accessories.	107
Rucker Co., The 4700 San Pablo Ave. Air and hydraulic control valves and cylinders; hydraulic pumps and valves; disconnect couplers; air and hydraulic machinery and power systems.	706 and 710
Ryerson, Jos. T., & Son, Inc. 4310 E. Bandini Blvd. Leaded alloy steel; steel tubing; hot-rolled carbon steel bars, plates and shapes.	510
S-P Mfg. Corp., The 12415 Euclid Ave. Power chucks; power collet chucks; air cylinders; hydraulic cylinders; valves and accessories.	1035
Safety Socket Screw Co. 6501 N. Avondale Ave. Socket screw products.	221
Sales Service Machine Tool Co. 2363 University Ave. Inclinable bench press; open-back inclinable press; open-back inclinable, flywheel-type press.	1031
Sandusky Abrasive Wheel Co. Park & Borden Ave. Grinding and cut-off wheels; mounted abrasive points; abrasive sticks and blocks.	264
Sargent Engineering Corp. 2533 E. 56th St. Hydraulic pumps, accessories; special gears.	169
Screw Machine Tool Co. 17565 Swift Ave. Toolholders; recessed toolholders; cross-forming slides for Acme Gridleys.	315
Scully-Jones & Co. 1901 S. Rockwell Ave.	554 Chicago 8, Ill. Recessing tools; chucks and chucking tools; tool ejectors; arbors and adapters; counterbores; countersinks; core drills; other precision holding tools; special tap driver; blades for centerless grinders; presetting gages.
Seibert & Sons, Inc. Route 24	920 Chenoa, Ill. Multiple drill spindles and production tools.
Service Machine Co. 7627 S. Ashland Ave.	1009 Chicago, Ill. Punch presses.
Sheffield Corp., The Box 893	656 Dayton 1, Ohio Production and toolroom gaging and inspection equipment.
Sheridan Products, Inc. 1054 E. Hyde Park Blvd.	269 Inglewood 3, Calif. Aircraft fabricating tools; hand chip chaser.
Siewek Tool Co. 2862 E. Grand Blvd.	900 Detroit 2, Mich. Drill jigs, fixture clamps and details; spring plungers, stops; toggle pads; torque and swivel screws; hand knobs; hand, steel ball; swivel shoes.
Simonds Abrasive Co. Tacony and Fraley Sts.	504 Philadelphia, Pa. Metal-cutting tools; grinding wheels, sticks, stones and abrasive grain.
Simonds Saw and Steel Co. 470 Main St.	504 Fitchburg, Mass. Metal-cutting tools; grinding wheels, sticks, stones and abrasive grain.
Size Control Co. 2500 W. Washington Blvd.	882 Chicago 12, Ill. Gages; gear and thread wires; gage cabinet sets; surface finish standards.
Skandia Tool Sales Co. 5880 Hollywood Blvd.	365 Los Angeles 28, Calif.
Skinner Chuck Co., The 95 Edgewood Ave.	111 New Britain, Conn. Chucks; solenoid valves; chucking equipment.
Slater, Paul B., Co. 2509 Yates Ave.	953 Los Angeles 22, Calif. Contour projectors; surface measuring instruments; gage blocks; gages; fixture-building accessories; honing machines; stones and mandrels; diamond lapping equipment.
Southern California Tool & Die Association 719 E. Gage Ave.	668 Los Angeles 1, Calif. Lounge for association members.

	Booth No.		Booth No.
Standard Electric Tool Co., The	1023	Taylor Dynamometer & Machine Co.	921
2488-96 River Rd.	Cincinnati 4, Ohio	6411 River Pkwy.	Milwaukee, Wis.
Brushing lathe; tool grinder; finisher; buffer-polisher; precision spindles; slides; feeds; machine tool attachments.		Precision drilling machines; static balancing machines; hydraulic dynamometers.	
Standard Gage Co., Inc.	459	Technical Supply Co.	1170
70 Parker Ave.	Poughkeepsie, N. Y.	St. Ludgardsstraat, 14	Antwerp, Belgium
Indicating and dial gages; comparators; fixed limit plug and ring gages.		Air compressors and vacuum pumps; spray guns.	
Standard Parts Co.	919	Thalco Glass Fiber Products	1188
1000 Broadway	Bedford, Ohio	765 S. Harvard Blvd.	Los Angeles 5, Calif.
Component parts for jig and fixtures.		Resins and reinforcements for tooling and plastic products.	
Standard Pressed Steel Co.	1163	Thor Power Tool Co.	155
Jenkintown, Pa.		175 N. State St.	Aurora, Ill.
Screw products; self-locking nuts, spring pins, aircraft fasteners, shop equipment.		Portable power tools including impact wrenches.	
Starrett Co., L. S., The	765	Thurston Mfg. Co.	359
121 Crescent	Athol, Mass.	45 Borden St.	Providence, R. I.
Hand measuring tools; precision instruments; dial indicators; precision ground flat stock; hacksaws, band saws and band knives.		Saws; milling cutters; end mills.	-
Steel City Testing Machines, Inc.	1183	Tocco Div., The Ohio Crankshaft Co.	414
8817 Lyndon Ave.	Detroit 38, Mich.	4620 E. 71st St.	Cleveland 1, Ohio
Brinell hardness testing machine; direct reading proving instruments; ductility testing machine; miscellaneous accessories.		Induction heating equipment; motor generators and ultrasonic cleaning and brazing equipment.	
Stocker & Yale, Inc.	850	Tomkins Johnson Co., The	660
77 Green St.	Marblehead, Mass.	617 N. Mechanic St.	Jackson, Mich.
Optical measuring instrument; tap analyzers; fluorescent machine lights; illuminated magnifiers; ultraviolet inspection.		Riveters; clinchers; reamers; die sinking milling cutters; remote controls; air and hydraulic cylinders.	
Sunnen Products Co.	752	Tool Engineer, The	271
7910 Manchester Ave.	St. Louis 17, Mo.	10700 Puritan Ave.	Detroit 38, Mich.
Precision honing machines and tools; external hones; portable honing equipment.		THE TOOL ENGINEER magazine.	
Super Tool Co.	416	Tool Sales Co.	909
21650 Hoover Rd.	Detroit 13, Mich.	46 Victor Ave.	Detroit 3, Mich.
Milling cutters; reamers; drills; lathe tools; glass tile; grinder half centers; carbide counterbores; saws; end mills.		See M-B Products Div.	
Superweld Corp.	876	Tool Specialty Co.	1171
6840 Vineland Ave.	North Hollywood, Calif.	1011 E. Slauson Ave.	Los Angeles 11, Calif.
Metal powders; hard facing compounds; welding rods.		Special carbide-tipped tools.	
Supreme Products, Inc.	221	Transmarae Corp.	1177
2222 S. Calumet	Chicago, Ill.	15 William St.	New York 5, N. Y.
Chucks; arbors; keys; keyholders; screwdriver attachments.		Horizontal extrusion press; thread roller; lathe.	
Sweetland, E. D., Co.	214	True-Trace Sales Corp.	167
940 N. Fair Oaks	Pasadena 3, Calif.	9830 E. Rush St.	El Monte, Calif.
405 Montgomery St.	San Francisco 4, Calif.	Hydraulic tracing controls; aircraft parts; attachments and accessories for machine tools; solenoid valves.	
Filters, lubricators and regulators; industrial air controls; air and hydraulic cylinders, valves and devices.			
Syntron Co.	884	Tubular Micrometer Co.	512
Homer City, Pa.		301 Armstrong Blvd.	St. James, Minn.
Vibrating parts feeders; vibrating conveyors; mechanical shaft seals; electric heating elements; selenium rectifier stacks.		Quality control measuring instruments including micrometers, verniers, rules, scales, gages, dial indicators; special adaptations of measuring instruments.	
Union Mfg. Co.		Union Mfg. Co.	405
		296 Church St.	New Britain, Conn.
		Air cylinders, filters, regulators and valves; bushings; chuck-holding devices; chuck jaws; chucks; hydraulic cylinders; die sets; guide and leader pins; bolster plates; springs; gas and diesel engines.	

Exhibitors

	Booth No.
United States Army 1515 Clay St. See Ordnance Corps.	348 Oakland, Calif.
U. S. Expansion Bolt Co. See New Standard Div.	954 York, Pa.
United States Rubber Co. 1230 Sixth Ave. Timing belts.	1169 New York, N. Y.
U. S. Tool Co., Inc. 255 N. 18th St. * Ampere, E. Orange, N. J. Slide feed; stock straightener; stock reels and cradles; scrap chopper.	1089
V & O Press Co., The, Div. of Emhart Mfg. Co. Notching presses.	171 Hudson, N. Y.
Van Keuren Co., The 176 Waltham St. Watertown 72, Mass. Plug gages; thread and gear measuring wires; optical flats; light wave measuring equipment; gage blocks; root diameter wires; steel calibrated balls.	863
Vascoloy-Ramet Corp. 800 Market St. Waukegan, Ill. Vertical toolholders; carbide cutting tools; boring tools, tool tips inserts and blanks; wear parts; wire drawing dies; solid toolbits; investment castings.	618
Vickers Inc. 1400 Oakman Blvd. Detroit 32, Mich. Hydraulic pumps and controls; animated displays.	608
Viking Tool & Die Shops 1010 Mission St. South Pasadena, Calif. Drill presses; stampings; dies; drill jigs; stoves; milling machine.	1108
Vlier Engineering, Inc. 4552 Beverly Blvd. Los Angeles 4, Calif. Thumbscrews; spring plungers; spring stops; fixture keys; toggle pads; screw-ball clamps; key clips.	600
Wade Tool Co., The 49-59 River St. Waltham 54, Mass. Hand screw machine; precision lathe; toolmaker's lathe; precision profiler.	321
Waldes Kohinoor, Inc. 47-16 Austel Place Long Island City 1, N. Y. Retaining rings; accessory and assembly tools; applications.	664
Wales-Strippit Corp. 345 Payne Ave. North Tonawanda, N. Y. Piercing and notching units and press equipment.	1027
Walker-Turner Div., Kearney & Trecker Corp. 900 North Ave. Plainfield, N. J. Light heavyweight machine tools; air feed attachment for drill presses.	614
Warner & Swasey Research Corp. 34 W. 33rd St. New York 1, N. Y. Instrument for checking and measuring machine parts gears, cams, turbine blades, propellers.	911
Webber Gage Co. 12900 Triskett Rd. Cleveland 11, Ohio Precision gage blocks and accessories.	867
Weldon Tool Co., The 3000 Woodhill Rd. Cleveland, Ohio	161
Western Machinery and Steel World 681 Market St. San Francisco 5, Calif. Metalworking publication.	217
Western Metals Magazine 198 S. Alvarado St. Los Angeles 57, Calif. Metalworking publication.	1161
Wetmore Tool Sales Co. 5320 E. Washington Rd. Los Angeles 22, Calif.	857
Whistler, S. B., & Sons 752 Military Rd. Buffalo, N. Y. Magnetic and universal adjustable perforating equipment.	1067
Willey's Carbide Tool Co. 1340 W. Vernor Hwy. Detroit 1, Mich. Carbide-tipped tools; diamond wheel dressing tools; diamond wheel.	303
Wisconsin Drill Head Co. 4987 N. 124th St. Butler, Wis. Multiple spindle drill heads; fixed center drill heads; lead screw tapping machines; special cutting tools; end mills.	857
Withrow, Arthur C., Co. 5511 District Blvd. Los Angeles 22, Calif. Industrial and automotive lubricants.	357
Wolf, W. F., Machinery Co. 2910 Santa Fe Ave. Los Angeles 58, Calif. Boring machines; duplicating machines; grinders; lathes; milling machines; radial drills; inspection equipment; vises; fixtures; screw machines, etc.	1083
Zero Index Co., Inc. 941 Westwood Blvd. Los Angeles 24, Calif. Drill jig bushings; basic drill jig fixtures.	225

NEWS



LOS ANGELES



featured

this month

Western Welcome Awaits ASTE Convention	145
Convention Program	148
ASTE Aloha	153
Technical Conferencees	154
Plant Tours	158
Women's Activities	160
Host Committee	162
Harry E. Conrad Interviewed on TV	165
T. G. Fechnay Dies	166
Book Committee Appointments	169
Positions Available, Positions Wanted	171
Coming Meetings	174

chapter news

Ann Arbor Area	164	Montreal	164
Baltimore	169	Muncie	169
Battle Creek	171	Nashville	165
Binghamton	173	New Haven	167
Boston	169	Niagara District	165
Buffalo-Niagara	173	North Texas	170
Calumet Area	168	Northern Massachusetts	167
Cedar Rapids	172	Northern New Jersey	168
Central Pennsylvania	164	Piedmont	165
Chautauqua-Warren	175	Pittsburgh	170
Chicago	171	Portland, Me.	173
Cincinnati	168	Portland, Ore.	170, 172
Dayton	173	Racine	170
Erie	175	Riverside	168
Evansville	170	Rochester	166
Fairfield County	173	Saginaw Valley	172
Golden Gate	173, 175	San Antonio	167
Grand River Valley	173	San Fernando Valley	169
Hamilton District	166	Schenectady	168
Hendrick Hudson	164	Seattle	166
Houston	173, 175	Southeastern Massachusetts	175
Indianapolis	175	Springfield, Ill.	168
Lima	165, 169	Springfield, Mass.	170
Little Rhody	165	Syracuse	166
Long Island	172, 173	Tri-Cities	164
Los Alamos	166	Twin Cities	167
Los Angeles	169, 172	University of Kansas	172
Louisville	168	Western Michigan	175
Madison	170	Windsor	164
Merrimack Valley	167	Worcester	166
Milwaukee	164		



Western Welcome

Awaits ASTE Convention

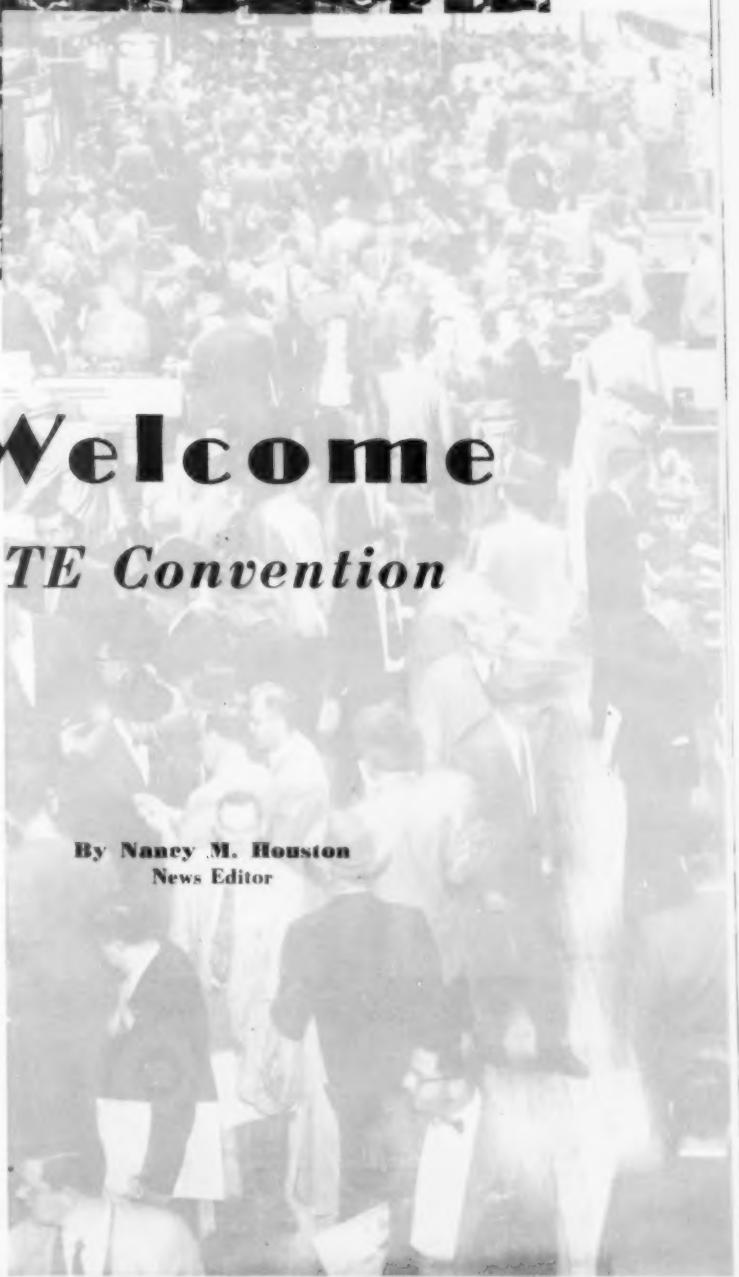
Enthusiasm for ASTE's first Western Industrial Exposition has spread to all phases of Society activities scheduled for Los Angeles during exposition week from March 14 through 18.

Support of the 275 companies who will be showing their products at Shrine Exposition Hall has been augmented by the intense interest of thousands of ASTE members planning to attend the program of industrial exhibits, conferences and plant tours.

California's Governor Goodwin J. Knight has proclaimed March 14-18 as Tool Engineering Week and is urging observance by all Californians "in extending appropriate recognition to the men and women engaged in this important industrial art."

(Please turn page)

By Nancy M. Houston
News Editor



(Continued from preceding page)

In his proclamation, Governor Knight states, "The tool engineering profession has played a leading role in developing the world's highest standard of living in our nation. Much of the responsibility for the continuing progress of industry rests in the talents of America's tool engineers."

Theme for the Society's big week in Los Angeles is "Tooling for Western Expansion." A wide variety of interests will be covered at conferences and panel discussions integrated under headings of: Professional Developments Day; Pressworking Day; Management Day; Processes Day; and Precision Control Day.

Tours of six industrial companies, known for their outstanding organizations and operations, make up the schedule of plant visits.

Welcoming ASTE will be: North American Aviation, Inc.; Lockheed Aircraft Corp.; McCulloch Motors Corp.; AiResearch Manufacturing Co.; National Supply Co.; and Byron Jackson Co.

This year's annual membership banquet will be held at the Cocoanut Grove of the Ambassador Ho-

Scene of the membership banquet will be the Cocoanut Grove, left, in the Ambassador Hotel. Evening technical conferences and meetings of the Board of Directors will also be held at the hotel, shown below.



tel, with Prentiss M. Brown, immediate past chairman of the board of Detroit Edison Co., as the speaker.

Those members and wives attending the banquet will also witness the first presentation of the Society's Gold Medal Awards and installation of the officers who will serve during 1955-56.

A vital part of annual meeting activities is the election of members to the Board of Directors. Men named at the House of Delegate's meeting will be installed at the semiannual meeting next October.

Since many of the ASTE members attending the convention may be planning side trips to San Francisco before or after exposition week, Golden Gate chapter has set up a hospitality committee in that city to help with hotel information and plant tours.

In addition, an ASTE service desk will be maintained for visiting members at the offices of Western Machinery & Steel World, 681 Market Street, San Francisco, where information regarding local membership and industry will be available.

Invitations to visit its rooms at the Statler Hotel in Los Angeles have also been extended to all ASTE members by Golden Gate chapter.



National Delegates representing ASTE's 124 chapters will hold all of their official functions, including the election of National Directors for 1955-56, at the new Statler Hotel, pictured above.

Additional Nominations 1955

The following men have been legally nominated by petition and their names should be considered along with those contained in the Annual Nominating Committee's Report of December, 1954 as qualified candidates for National Director.

Carl Kertesz, serving his third term on the National Membership Committee, assisted in the formation of the Paterson and Keystone chapters of ASTE. He is vice president of Design Tool Corp. of New York City. A charter member of the Greater New York chapter and a senior member since 1940, he has held numerous chapter offices culminating in the chairmanship. As a delegate in 1951 he was chairman of the House of Delegates meeting. He is a graduate of Polytechnic Institute of Brooklyn and holds memberships in the American Ordnance Association, New York Tool and Die Joint Education Committee. He is also an honorary member of the French Engineers in the U. S.

A. A. Reddy, past chairman of the Wichita chapter, is chief tool engineer for Paramount Products Corp. of Peabody, Kansas. He has been a member of Wichita chapter since 1949 and served in the positions of treasurer and second vice chairman. He was delegate representative in 1951, 1953 and 1954. Professionally, Mr. Reddy served as staff assistant in the methods engineering department of Beech Aircraft Corp. from 1939 to 1954.

Leslie C. Seager, chief production engineer, The Eimco Corp., Salt Lake City, Utah, is concluding his third term as a member of the National Professional Engineering Committee. Active in the formation of Salt Lake City chapter, he served two terms as chairman and has been an active member of several committees. He aided in the program enabling Utah State Agricultural College to establish its tool engineering department, and helped set up the tool engineering curriculum. He was among those instrumental in establishing college scholarships offered annually by Salt Lake City chapter. He has served as treasurer, secretary and president of Utah Engineering Council, and is a member of the Institution of Production Engineers in Great Britain and the American Ordnance Association.



Carl Kertesz



A. A. Reddy



L. C. Seager

MARCH
14

MONDAY

Professional Developments Day

Exposition Hours: 9 am to 5 pm

Conferences

2 pm, Shrine Foyer

How to Cut Tooling Costs

"Magnesium Plate for Strong Light-weight Fixture Construction" (23T1). Raymond L. Nelson, Development Engineer, Magnesium Technical Service, Dow Chemical Co.

2:30 pm, Shrine Auditorium

Numbering Codes Save Time

"Uniterm Coding—A New Tool for Controlling Information" (23T2). Dr. Mortimer Taube, President, Documentation, Inc.

"Coding and Administration of Engineering Drawings" (23T3). James A. Catto, Manager, Administrative Services Dept., Ford Motor Co.

8 pm, Embassy Room, Ambassador Hotel

Developments in

Tool Engineering Research

"Findings and Directions in Chip Breaker Design" (23T4). Dr. Erik K. Henricken, College of Engineering, University of Missouri.

"Some Recent Research on Twist Drills and Drilling" (23T5). Carl J. Oxford, Jr., Research Engineer, National Twist Drill & Tool Co.

Report on ASTE research into temperature distribution in the workpiece. Col. Leslie S. Fletcher, Research Director, American Society of Tool Engineers.

Plant Tour

1 pm, AiResearch Manufacturing Co.



TUESDAY

Pressworking Day

Conferences

9:30 am, Shrine Auditorium

New Materials and Uses for Plastic Tooling

(Co-sponsored by the Society of Plastics Engineers)

General Chairman—Walter H. Kadlec, president, Southern California Section, Society of Plastics Engineers

Moderator—G. J. Walkey, Manufacturing Research, Lockheed Aircraft Corp.

"Tool Manufacture as Influenced by Properties of Epoxies" (23C1A). John Delmonte, General Manager, Furane Plastics, Inc.

"Cast Plastic Tooling as Used in Aircraft Applications" (23C1B). Louis E. Frost, Tool Engineer, North American Aviation, Inc.

"Reinforced Laminates in Aircraft Tooling" (23C1C). Richard Morozowicz, Plastics Engineer, Douglas Aircraft Co.

"Are Plastic Tool Standards Needed?" (23C1D). George C. Adams, Staff Engineer, Rezolin, Inc.

2 pm, Shrine Auditorium

Presswork Tools and Methods

Panel Discussion (23C2)

Harry Aikens, Factory Manager, Norris Thermador Corp.

Max Lauderback, Superintendent of Metallurgy, Kaiser Steel Corp.

Alfred T. Rando, Partner, B & M Engineering Co.

E. C. Rork, Plant Manager, Arcturus Manufacturing Co.

L. H. Trautman, Central Mechanical Engineering Dept., Aluminum Co. of America.

8 pm, Gold Room, Ambassador Hotel

Leasing or Installment

Buying of Machinery

"Advantages in Leasing Production Equipment" (23T6). R. A. Perkins, Assistant Secretary-Treasurer, Kearney & Trecker Corp.

8 pm, Embassy Room, Ambassador Hotel

Getting the Most out of Automation

"Setting Goals in Automation" (23T7). W. Fay Aller, Director of Research, Sheffield Corp.

Plant Tour

8:30 am, North American Aviation, Inc.

WEDNESDAY

Management Day

Exposition Hours:
9 am to 5 pm

Conferences

9:30 am, Shrine Foyer

Preparing for Manufacturing Responsibilities

General Chairman—R. E. McKee, Chairman, ASTE National Education Committee.

Moderators—R. L. Hand, Manager, General Dept. 28-01, Lockheed Aircraft Corp.; and J. L. Crawford, Superintendent of Tool Fabrication, Santa Monica Div., Douglas Aircraft Corp.

"General Approach to Realistic Manufacturing Engineering Curricula" (23C-3A). L. M. K. Boelter, Chairman, Dept. of Engineering, University of California at Los Angeles.

"The Specialized Curriculum in Manufacturing Engineering" (23C3B). Ralph J. Smith, Head, Engineering Dept., San Jose State College.

"In-Plant Engineer Training for Large Organizations" (23C3C). G. W. Papen, Manager, Production Engineering Dept., Lockheed Aircraft Corp.

"In-Plant Engineer Training for Small Organizations" (23C3D). D. Palmer, President, Dwight Palmer & Associates.

2 pm, Shrine Foyer

New Advances in Gear and Spline Manufacture

"Planning for Effective Gear Inspection" (23T8). Fred Bohle, Manager, Machine Development, Illinois Tool Works.

"Rolled Flow Forming of Toothed Parts" (23T9). Harry Pelpfrey, Chief Research Engineer, Michigan Tool Co.

2:30 pm, Shrine Auditorium

Selecting the Right Machine Tool

"Bases for Selecting Standard vs. Special Machine Tools" (23T10). D. E. Hawkins, Vice President, Engineering and Machine Tool Sales, Greenlee Brothers & Co.

8 pm, Embassy Room, Ambassador Hotel

Coordination of Manufacturing Management

Panel Discussion (23C4)

General Chairman—H. W. Linton, Chief Plant Engineer, North American Aviation, Inc.

Moderator—J. R. Weaver, Manager of Manufacturing Engineering, Westinghouse Electric Co.

E. W. Ernst, Manager, Machine Tool Equipment and Planning, General Electric Co.

R. J. Gould, Superintendent, Motorola, Inc.

R. J. Mountain, Chief Industrial Engineer, Pacific Div., Bendix Aviation Corp.

A. A. Signorelli, President, Design Service Co.

Plant Tour

12:30 pm, National Supply Co.

Other Events

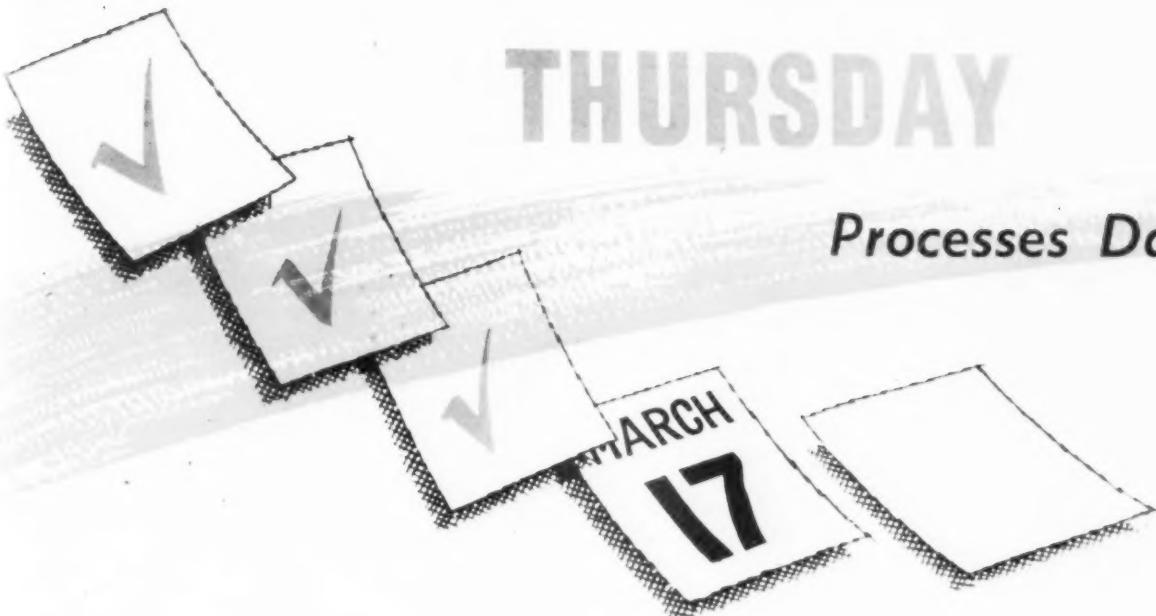
8:30 am, Los Angeles Room, Statler Hotel
President's Breakfast for National Delegates

12 noon, Los Angeles Room, Statler Hotel
National Delegates Luncheon

1 pm, Golden State Room, Statler Hotel
House of Delegates Meeting

THURSDAY

Processes Day



Conferences

9:30 am, Shrine Foyer

New Tooling Methods

"Mercury-Pattern Precision-Cast Design and Tooling" (23T11). Dr. Irvin R. Kramer, Vice President, Mercast Corp.

"Ceramic Parts and Tooling for High-Temperature Applications" (23T12). Dr. R. F. Rea, Manager, Research and Development Branch, Stupakoff Ceramic Manufacturing Co.

2 pm, Shrine Auditorium

New Extrusion Techniques

"20mm Shell Tooling and Production" (23T13). W. R. Powl, Plant Engineer, Armstrong Cork Co.

"Tooling for Cold Steel Extrusion" (23T14). J. F. Leland, Manager, Metal Forming Div., Parker Rust Proof Co.

Annual Banquet

7 pm, Cocoanut Grove, Ambassador Hotel

"Atomic Energy for Industry"

Speaker: Prentiss M. Brown, immediate past Chairman of the Board of Directors, Detroit Edison Co.

Plant Tours

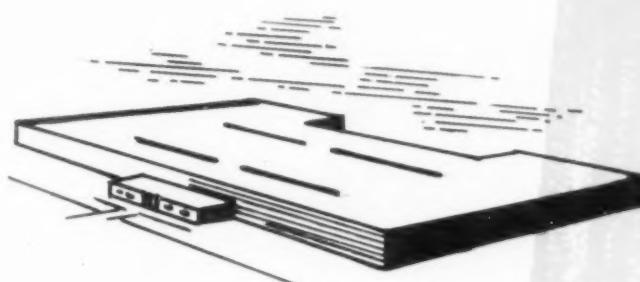
8:30 am, McCulloch Motors Corp.

1 pm, Byron Jackson Co.

Other Events

9 am, West Gold Room, Ambassador Hotel
Board of Directors Meeting

12 noon, East Gold Room, Ambassador Hotel
Board of Directors Luncheon



FRIDAY

Precision Control Day

Exposition Hours:
9 am to 5 pm

MARCH
18

Conferences

9:30 am, Shrine Auditorium

Realistic Tolerances for Quality Control

(Co-sponsored by the American Society for
Quality Control)

Moderator—William M. Ferguson, General Manager, Quality Control Co.

"Opening Tolerances for Closer Fitting Parts" (23C5A). E. E. Bates, Assistant to Director, Quality Control Div., Northrop Aircraft Corp.

"Size Tolerance vs. Positioning Tolerance" (23C5B). C. E. Deardorff, Chief Engineer, Hydraulic and Electro-Mechanical Div., Bendix Aviation Corp.

"Converting Engineering Specifications into Shop Practice" (23C5C). R. F. Hurt, Chief Project Planner, Lockheed Aircraft Corp.

"Who Inspects the Inspector?" (23C5D). F. H. Squires, Quality Manager, Lear, Inc.

"New Slants on Surface Roughness" (23C5E). J. A. Broadston, Armament Engineer, Aerophysics Laboratory, North American Aviation, Inc.

2 pm, Shrine Auditorium

Latest Advances in Heat Treatment

"Heat Treatments of Steels" (23T15). A. V. Luebbers, Jr., Chief Metallurgist, and R. H. Lundquist, Metallurgist, California-Doran Heat Treating Co.

"Aluminum Heat Treatment" (23T16). Dr. George Perkins, General Director, Products and Application Dept., Reynolds Metals Co.

Plant Tour

8:30 am, Lockheed Aircraft Corp.

Other Events

9 am, West Gold Room, Ambassador Hotel
Board of Directors Meeting

12 noon, East Gold Room, Ambassador Hotel
Board of Directors Luncheon





ASTE Aloha

**there's still time to make reservations
for your Hawaiian Holiday**



Aloha means many things—hello, hi, 'till we meet again, so long—but when alohas are being said Saturday, March 19, at Los Angeles International Airport, it will mean bon voyage to ASTE members and their families starting out on their Hawaiian holiday.

No one attending ASTE's Western Industrial Exposition in Los Angeles should pass up this priceless opportunity to extend a business trip into an unforgettable vacation.

The cost for the 7-day ASTE holiday in Hawaii is low, just \$271 plus tax which covers round trip fare on a United Airlines Mainliner and accommodations at a Waikiki Beach hotel of your choice. Meals are on the European plan, giving visitors full range to try the famous dining spots on the Islands.

The enchantment that is Hawaii appeals to travelers for a variety of reasons. Vacation life there is the way you want it.

Weather is ideal. Cool trade winds moderate the sub-tropical temperature—it varies less than 10 de-

grees between noon and midnight, with the average in the high 70's.

Days can be spent loafing on Waikiki Beach, swimming in the surf, or visiting the many scenic spots via rented car or low-cost escorted limousine tour.

You can golf on fairways surpassingly beautiful, or stage a daily battle over the tennis net. You can test your balance on a surfboard, or try your hand at some of the sportiest deep-sea fishing in the world.

There's still time to be included in this outstanding vacation trip. For full information, write now to: ASTE News Editors, 10700 Puritan Ave., Detroit 38, Mich.

Technical conferences

Value of any technical society program can be measured by the speakers and their topics. The following summaries of those papers available at press time indicate the importance of the subjects to be covered, the variety of interests represented and the authority of the speakers. It is obvious that the 23rd Annual ASTE Meeting will again place information and experience on tool engineering methods and processes into the public domain.

Anyone who understands that the rate of technical progress is directly related to the dissemination, absorption and application of technical data, has realized that the rate of data production is outstripping the ability of conventional methods for its filing and use. Dr. Mortimer Taube, president, Documentation, Inc., Washington, D. C., describes a new tool for the handling of technical information in his paper, "Uniterm Coding of Technical Data."

Heavy tools, especially jigs and fixtures that must be handled frequently, can introduce serious problems in the production process. "Magnesium Plate for Strong Lightweight Fixture Fabrication" is a paper to be presented by Raymond L. Nelson, development engineer, Dow Chemical Corp., Midland, Mich., which will point up those characteristics of magnesium that make it desirable for production and inspection tools.

The more factual data there is at hand, the easier is the tool engineer's job. The mechanism of chip breaking has been investigated mathematically, geometrically and physically, with some disagreement in conclusions. More light is shed on the subject, especially with regard to clamped chip breakers, by Dr. Erik K. Henriksen, Mechanical Engineering Dept., University of Missouri, Columbia,

Mo., in his paper, "Findings and Directions in Chip Breaker Design."

While the general appearance of twist drills has changed little in the past 50 years, continuing research and development has resulted in vastly improved performance during this period. Recent findings of research on twist drills and drilling techniques will be outlined by Carl J. Oxford, Jr., research engineer, National Twist Drill and Tool Co., Rochester, Mich., in his paper, "Some Recent Research on Twist Drills and Drilling."

The truly automatic process will be based on the feedback instructions of gaging equipment to control production and assembly of parts. In his paper, "Setting Goals in Automation," W. Fay Aller, director of research, Sheffield Corp., Dayton, Ohio, describes the role of gaging in a hypothetical automatic ball-bearing plant.

Considered by many to be a costly evil applied only to the most accurate gears, the right degree of gear inspection actually holds manufacturing expenses to a minimum. Fred Bohle, manager, Machine Development Div., Illinois Tool Works,



Mortimer Taube



R. L. Nelson



E. K. Henriksen



C. J. Oxford



W. F. Aller



Fred Bohle

Chicago, Ill., outlines in what combinations gear inspection methods can be used to give reliable answers at minimum expense in his paper, "Planning for Effective Gear Inspection."

A description of the frozen-mercury will be presented in such a way that its relationship to other precision casting techniques will be apparent. In the paper, "Mercury-Pattern, Precision-Cast Design and Tooling," Dr. Irvin R. Kramer, vice president, Mercast Corp., New York, N. Y., will cover examples of complicated castings produced by the process.

Because heat treatment can widely extend the properties of existing steels, this process is of value to tool engineers. Heat treatment of steels, including tooling grades, heat-treating methods and equipment are described by A. V. Leubbers, Jr., chief metallurgist, and R. H. Lundquist, California-Doran Heat Treating Co., Los Angeles, Calif., in their paper, "The Heat Treatment of Steels."

Thermal treatment of aluminum alloys is accomplished in many different types of equipment. Dr. George Perkins, general director, Products and Applications Dept., Reynolds Metals Co., Louisville, Ky., outlines the factors that govern what types of equipment should be used in his paper, "Aluminum Heat Treatment."

Other papers, noted on the complete five-day program beginning on page 148, will be given by: J. A. Catto, Col. L. S. Fletcher, R. A. Perkins, Harry Pelphrey, D. E. Hawkinson, Dr. R. F. Rea, W. R. Powl and J. F. Leland. Abstracts of papers by Dr. Rea, Carl Oxford and Dr. Henriksen appear on pages 95, 99 and 103, respectively.



I. R. Kramer



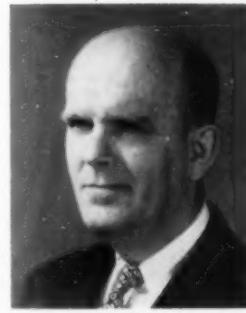
A. V. Leubbers



R. H. Lundquist



George Perkins



J. A. Catto



R. A. Perkins



Harry Pelphrey



R. F. Rea



D. E. Hawkinson



W. R. Powl

panel discussions

Since engineers in general, and tool engineers in particular, are seeking ways and means of advancing through their chosen fields to positions of greater responsibility, "Preparing Engineers for Manufacturing Responsibilities" will be the topic for a panel session. The first prepared talk covers the beginning of an engineer's training and presents the viewpoint of an educator on just what should comprise a good manufacturing engineering curriculum.

Ralph J. Smith, head, Engineering Dept., San Jose State College, feels that the standard mechanical engineering curriculum prepares a man for proficiency in design and that a much different approach should be made by the prospective production engineer.

Dwight Palmer, president, Dwight Palmer & Associates, will discuss the position of the engineer in a small organization and the methods by which he is trained. G. W. Papen, department manager, Production Engineering, Lockheed Aircraft Corp., will cover the more formal in-plant training by which an engineer is fitted into a large company.

A feature of Precision Control Day will be a panel session on "Quality Control Through Real-



L. H. Trautman



L. M. K. Boelter

istic Tolerances," co-sponsored by the Los Angeles chapter of the American Society for Quality Control. E. E. Bates, assistant to the director, Quality Control Div., Northrup Aircraft, Inc., will statistically prove the value of a method for assigning tolerances on mating parts to permit greater individual tolerances at the sacrifice of allowance. Size tolerance vs. position tolerance will be discussed by C. E. Deardoff, chief engineer, Hydraulic & Electro-Mechanical, Pacific Div., Bendix Aviation Corp., particularly for combination and accumulation situations.

Communication between design and production departments is ordinarily an impersonal matter that can lead to misunderstandings in the shop. R. H. Hurt, chief project planner, Lockheed Aircraft Corp., describes the functions of a group of engineers placed organizationally between design and production. This group interprets design instructions to the shop and mediates disagreements.

F. H. Squires, quality manager, Lear, Inc., will



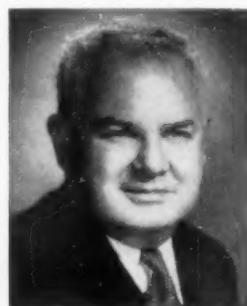
John Delmonte



L. E. Frost



Richard Morozowicz



George Adams



Harry Aikens



Max Lauderback



E. C. Rork



A. T. Rando



R. J. Smith



G. W. Papen



Dwight Palmer



J. R. Weaver



E. W. Ernst

talk about inspecting the inspector via quality control and how this improves product quality. If time permits, J. A. Broadston, North American Aviation, Inc., will describe the work of ASA Sectional Committee B46 which led to the publication of ASA Standard B46.1-1954 on surface roughness designation and control, and will outline contents of the standards.

"Plastics Tooling for Production" will be the general subject of a panel session co-sponsored by the Southern California Section of the Society of Plastics Engineers. Each of the panel members will deliver a short talk and then the meeting will be opened for questions.

Scope of this session will be wide, as evidenced by variety in the prepared talks and in the experience of the panel members. George C. Adams, staff engineer, Rezolin, Inc., for example, will outline the rapid, uncontrolled growth in the use of tooling plastics and will give his answer to the question, "Are plastic tool standards needed?"

The subject of epoxy resins, especially cast epoxies, will be discussed by John Delmonte, general manager, Furane Plastics, Inc. Although hardening of cast epoxies has been accompanied by considerable exothermic heat, new types will be described that harden with little or no generation of heat.

In addition to describing typical tools made of cast plastics for application in the aircraft industry, Louis E. Frost, tool engineer, North American Aviation, Inc., will indicate how these tools are constructed and used. Paralleling this talk will be one by Richard Morozowicz, plastics engineer, Douglas Aircraft Co., on the topic of reinforced, laminated plastics tools used by airplane manufacturers. The epoxies will be covered by this presentation too.

Other panel participants, listed on the complete program, include: Harry Aikens, Max Lauderback, Alfred T. Rando, E. C. Rork, L. H. Trautman, L. M. K. Boelter, J. R. Weaver, E. W. Ernst, R. J. Gould, R. J. Mountain and W. M. Ferguson.



R. J. Gould



R. J. Mountain



W. F. Ferguson



E. E. Bates



C. E. Deardorff



R. F. Hurt

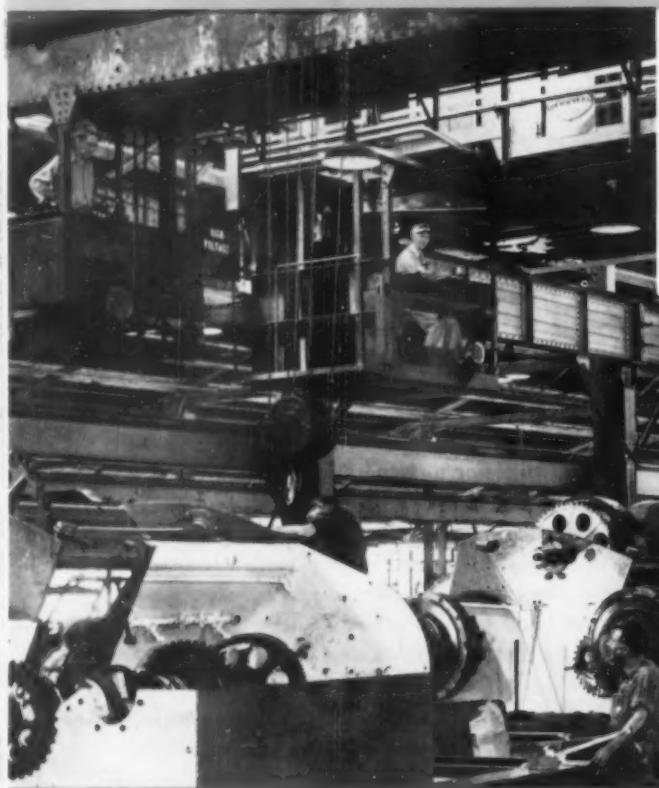


F. H. Squires



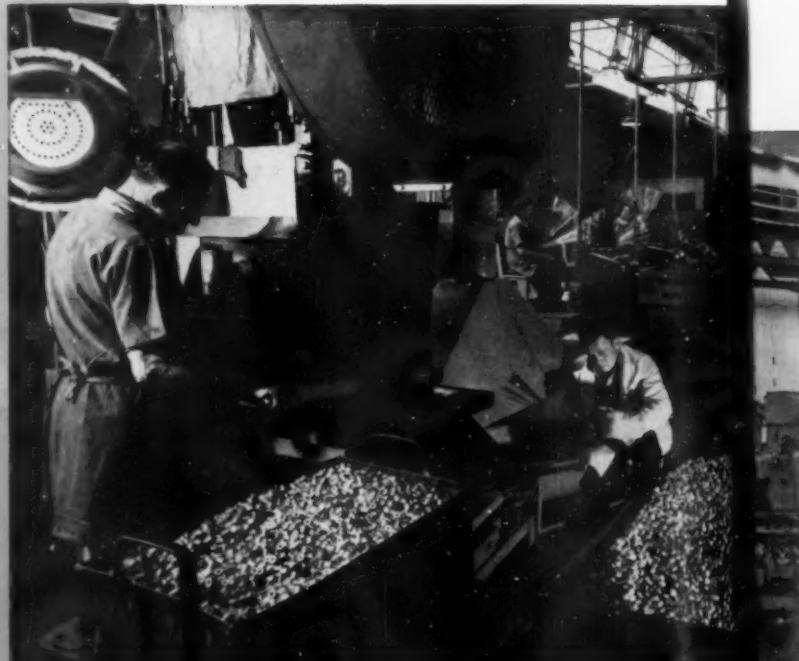
J. A. Broadston

The USAF F-11 Super Sabre, right, the Air Force's fastest, most powerful jet fighter, will be a major attraction for ASTE visitors at North American Aviation, Inc.



One of the six industrial tours slated for exposition week will take ASTE members through the California plant of the National Supply Co., world's largest manufacturer and distributor of oil field machinery and equipment. Shown above is a close-up of the assembly department.

PLANT Tours

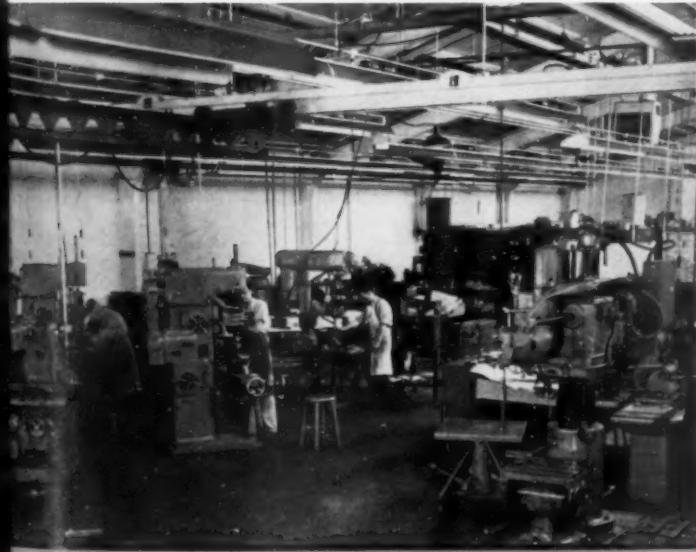


Extrusion of oil cooler tubes is a process which will interest members participating in the tour at AiResearch Manufacturing Co., pioneer in the development of many items of aircraft accessories.

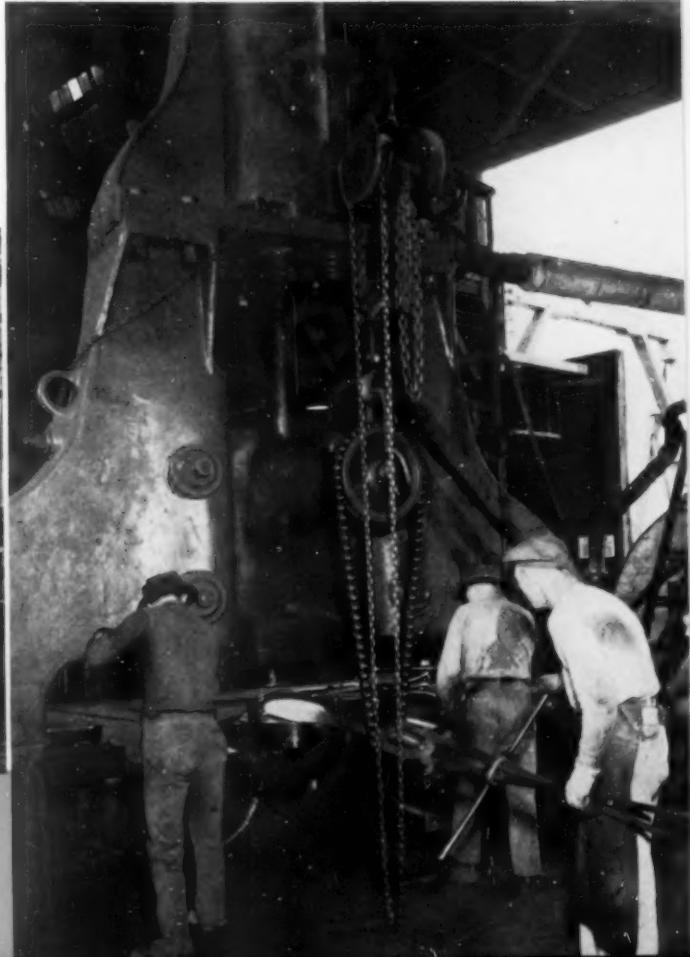


Lockheed Aircraft Corp., above, is currently producing the Super Constellation in commercial and military versions. The corporation requires evidence of United States citizenship of visitors, as do North American Aviation and AiResearch Manufacturing Co., and emphasizes the 'no camera' ruling. Since participation in all tours is limited, early registration is urged.

At Byron Jackson Co., right, the ASTE tour will include three plants involving the production of pumps and other equipment for the special needs of the oil industry. This view of the oil tool plant shows cutting and shaping of weldless links.



Self-sufficiency is the theme for operations at McCulloch Motors Corp., which makes nearly all components for its products and most of its own machinery. "It pays to do the whole job yourself" is a by-word.





Women's

Activities

By Edith R. Saunders
Assistant News Editor

Those wives who will be West Coast bound with their ASTE husbands next March for the 1955 Western Industrial Exposition, can look forward to an exciting week in Los Angeles. The Women's Activities Committee, headed by Mrs. Wayne Ewing, wife of ASTE's national secretary, has bent every effort to plan a full program of varied activities.

The schedule includes shopping trips, visits to radio and television programs and art galleries, a movie studio tour, and several luncheons.

Registration desks for these tours will be in the lobbies of both the Ambassador and Statler Hotels. There will be a choice of two tours each day on Tuesday, Wednesday and Thursday.

Even though no tours are scheduled for Monday allowing for the fact that many convention-goers may still be arriving, a get-acquainted tea will be held from 2 to 4 p.m. at the Ambassador Hotel.

The social whirl starts on Tuesday with buses leaving at 9 a.m. to take one group on a tour of Forest Lawn Cemetery followed by luncheon at Pasadena Bullocks, a store world-famous for its beautiful contemporary architecture. After lunch-

eon this group will go to Huntington Library and Art Gallery.

Forest Lawn Cemetery boasts one of the finest collections of world-famous religious art treasures. It is noted for the Hall of Crucifixion which houses America's largest religious painting and the stained glass window of "The Last Supper." Huntington Library and Art Gallery is renowned for its original manuscripts and paintings.

The alternative tour for Tuesday is a trip to well-known Knott's Berry Farm where ample time will be allowed for exploring the replicas of an authentic gold-rush town in early California days. Among other points of interest are an early gold mine, Hangman's Tree, an adobe chapel, the Ghost Town and Calico Railroad, the actual old narrow gage train of Denver and Rio Grande fame.

Wednesday will offer a choice between a trip to Farmers' Market and a tour of Columbia Pictures Studio. Both start at 9:30 p.m. Farmers' Market, a unique shopping center for groceries, clothing and gifts, has more than 160 stalls and attractive sidewalk restaurants.

The group going to the movie studio on Wednes-



Columbia Broadcasting System's fabulous Television City will be on the itinerary for ASTE wives who plan to see some of the "live" TV programs which emanate from Hollywood.

They will get a behind-the-scenes peek at how films are made, as well as lunch in the studio commissary. Thursday will mark the last day of planned activities for the gals. They can choose either a trip to Oceanarium and Palos Verdes or "Queen for a Day" and other television programs. Tours will begin in mid-morning and the women will be returned in plenty of time to "freshen up" before joining their husbands that night for the 23rd Annual Banquet in the Cocoanut Grove of the Ambassador Hotel.

Wardrobe planning is an essential part of making the trip enjoyable. It should be kept in mind that March in California, particularly the Los Angeles area, has an average noon temperature of 65 degrees. The climate calls for the traditional spring clothes with an accent on lightweight wool suits. A full-length coat is always a versatile wrap.

Cocktail dresses lean toward silk and taffeta and lightweight wool. Sport clothes and wool jersey separates are always good in keeping with the emphasis on patio life. Knit dresses in light colors also get the nod.

There is an average of six rainy days in the Los Angeles area during March, according to U. S. Weather Bureau statistics. An umbrella might prove a friend in need for saving a hairdo in the event of an unexpected shower.

Knott's Berry Farm
takes the visitor back to the days of
yesteryear when the discovery of gold in
the hills lured thousands to
California on get-rich-quick adventures.



The Huntington Library houses a rare book collection numbering 150,000 volumes and an original manuscript stack of one million.



A leisurely luncheon at one of the many sidewalk restaurants can be one of the highlights of a trip to Farmers' Market.

EXPOSITION

HOST

Committee



C. L. Almquist
General Chairman



J. E. Riddle
Vice Chairman



R. L. Chrissie
NPC Zonal Member

Much of the success of an ASTE Annual Meeting depends upon the work of the Host Committee. Members of the 1955 Committee are pictured here. Chairmen not shown are: Division Co-Chairman C. E. Blanchard; J. R. Matthew, Co-Secretary of the Committee; S. E. Adamick, tickets; C. W. Barnthouse, session arrangements; J. J. Curley, plant tours; R. F. Dorn, registration; J. E. Ekstromer, Jr., supplemental housing; and Paul Jones, Jr., session moderators.



Peter Carter



P. B. Slater



Anton Peck



P. E. Lenk
Co-Secretary

Division Co-Chairmen



Rudolf Regen



F. X. Bale



A. E. Cram



A. J. Denis



C. T. Weitzel
Banquet



Lincoln Mager
Luncheons



C. E. Commeford
Entertainment



J. S. Wajdik
Reception



Mrs. Wayne Ewing
Women's Activities



K. H. Griffin
Plant Tours



W. E. Brainard
Technical Sessions



A. H. Petersen
Technical Sessions



S. E. Winquist
Education Activities



George Adams
Transportation



J. H. Stansbury
Transportation



P. R. Burt
Signs



W. F. Herzog
Signs



V. M. Sells
Session Arrangements



G. A. Singer
Housing



L. D. Pomerantz
Registration



H. C. Emerson
Tickets



M. C. Aliu
Publicity



L. W. Goodwin
Publicity



T. M. Gibson
Budgets



E. G. Gray
Budgets



W. V. Hostettler
Records and Reports



Sidney Rosenberg
Records and Reports



E. L. Cutler
Emergency



A. D. Lewis
Emergency

Cutting Waxes Topic at Hendrick Hudson

"Cutting Waxes in Industry" was the subject under discussion at the recent meeting of the Hendrick Hudson chapter. Some 65 members and guests were present when William G. Thomas,



Thomas

Buffalo district manager for S. C. Johnson & Son Co. was the guest speaker. Mr. Thomas's presentation included a color sound movie and a discussion of new achievements in improved tool life, superior finishes and higher work speeds through modern wax base coolants. Another feature of the program was a fastener display put on by Nick Hein, manager, and Fred Pufpaff, design engineer of Simmons Machine Tool Co.

The nominating committee reported a double slate of officers for the February election with a blank column for write-in of floor nominations. The committee consists of Dick Sipel, chairman, Harry Osterburger, Frank Gorke, Ernie Heyman and Earl Heiner.

—Macmillan McElwain

Pennsylvania Chapter Hears Field Engineer

When the Central Pennsylvania chapter met at the West York Inn in York, Pa., on January 6, the guest speaker was Ernest E. Pawley, field engineer for the Sheffield Corp. His topic was "Ultrasonic Machining." An unusually long question and answer period attested to the interest in the topic.

Besides many from other technical societies, a special guest was Harry Seville, superintendent of industrial lay-out at the York Corp. Sixty attended the meeting. —Paul F. Leese

G. M. Rice Discusses Plastic Tooling

"Fabrication of Plastic Tooling" was the topic of a talk given at the Tri-Cities January meeting by George M. Rice, sales manager, Ren-ite & Renaud Plastics, Inc., Lansing, Michigan. The dinner session was held at the Rock Island Arsenal cafeteria.

Preceding Mr. Rice's discussion was a showing of a new film by Eastman Kodak Co. on the magnification of time through speed photography.

—Clifford C. Vogt



ANN ARBOR PLANT TOUR—Chapter officers and Ford plant officials who participated in Ann Arbor's January plant tour are at the head table. From left are: J. R. Frei; L. H. Fleming, first vice chairman; P. W. Holloway; A. J. Lobbestael; J. B. Sablacen, technical speaker; Dell Asplund, at microphone, chapter chairman; J. S. French; C. P. McKelvey; K. E. Moltrecht, program chairman; and Mark Kaiander. The group viewed new processing methods and automation.

Ann Arbor Chapter Tours Ford Motor Co.

The Ann Arbor chapter experienced an exceptionally large turnout for its January 19 meeting, held at the Ford Motor Co., Ypsilanti, Mich. Attendance numbered 223.

The group toured Plant #1 and #2, which has been in operation for only six months. Dinner was served in the plant cafeteria.

The speaker at the dinner was Joseph Sablacen, manager of manufacturing engineering, Ford Motor Co.'s Parts and Equipment Manufacturing Div. He spoke on the "Present and Future of Automation." Karl E. Moltrecht, program chairman, arranged the meeting.

—Laurence A. Charnitsky

Montreal Officers Review Chapter Operations

A panel discussion on "New Ideas for Our Chapter" highlighted Montreal's December meeting. A large turn-out of 150 members was on hand to participate in the program on furthering the aims of the chapter.

Robert B. Douglas, past president of ASTE and head of the Society's Research Fund Committee, gave a talk on "The Tool Engineer and the Automatic Age." Various officers were called on to describe the duties of their offices and what had been accomplished during their tenure.

The general membership was asked for any suggestions which might prove helpful in better meeting the needs of the chapter and its members.

—F. C. Henderson

ASTE Member Elected Association President

Steve Pohlhammer, program chairman of the Milwaukee chapter, has been elected president of the Milwaukee Tool, Die & Machine Shop Association. He is vice president and chief tool engineer of the Northwest Tool & Engineering Co. and the Wisconsin Drill Head Co. A member of the Milwaukee ASTE chapter for more than 12 years, Mr.

Pohlhammer has held the offices of treasurer, secretary and second vice chairman. He has been associated with the production field of tool engineering for the past 35 years.

—Walter Behrend

Windsor ASTE Chapter Welcomes New Members

After a talk on milling of hardened steel by L. B. Monosmith, director of research at Sundstrand Machine Co., at Windsor's January meeting, 18 new members were welcomed to the chapter.

They are: A. C. Cooper, C. R. Beckerson, S. K. Brown, D. S. Campbell, Stanley Corlett, Lawrence Coughlin, R. A. Halford, Jr., Jack Ibbeson, L. O'Brien-Kinsey, J. J. Komar, E. W. Lane, B. M. Linus, R. D. Lowry, M. K. Maolloy, F. G. Palin, W. C. Poisson, L. G. Schlappner and O. L. Shippe.

—A. Underwood, Jr.

Hydraulics Subject of LIMA Meeting

Ninety seven members and guests of the Lima chapter assembled to hear E. O. Clark of Vickers, Inc., speak on "Hydraulics as Applied to Industrial Machinery." It was the January 20 meeting, held in the Royal Pine Room.

Mr. Clark, manager of industrial products sales, prefaced his talk with a brief resume of his duties as director of General Industrial Equipment, Division of the Business and Defense Service Administration. He was recently appointed to this position as its first director which is a rotation system by which experienced industrial men voluntarily contribute their services to the government without compensation for a period of six months or longer.

New members were introduced. They were: Reece A. Stanley, Presley E. Smith, Clark A. Carey, Norbert F. Stienmen and Harold Matanin.

A guest list of local industry included: A. B. Yant, Jack Burgoon, Wilbur Petry, Virgil Myers, Bob Ampler, Bill Thomas, Dale Pankratz, Walt McDaniels, Lonnie Risner, Richard Gartner, Fred Pulchrum, John Fox and Don Lamphar.

—Donald L. Cox

Nashville Members Hold Holiday Party for Wives

A Christmas gathering for members and their wives was on Nashville's agenda for December 18. The party was held at the Rawlings Dinner Club and offered a festive program on dinner, dancing and entertainment. More than 40 members and guests attended.

—Harry O. Collins



LIMA MEMBER PROMOTED—Chairman Robert Fromson, right, congratulates Second Vice Chairman W. J. James on his new company affiliation. It was Mr. James' last executive meeting before joining Allied Products of Eaton Rapids, Mich., as its new plant manager.

Surface Finishes Covered by Piedmont Speaker

"Standards and Equipment for Measurement of Surface Finish" was discussed December 13 at a meeting of Piedmont chapter. Speaker was C. Thorpe Thompson, sales engineer, Brush Electronics Co., Cleveland, Ohio.

After reviewing the new ASA Standard B.46, Mr. Thompson demonstrated the Brush Surfindicator and also the new Metal Indicator to analyze and identify unknown metals, starting from pieces of known analysis.

Winner of the chapter's "Piedmont Tool Engineer" contest was named and presented with \$5-prize. Recipient was Dan Riggs. —Howard A. Longfellow



LITTLE RHODY SCHOLARSHIP WINNER—Joseph P. Crosby, national ASTE president, presents Maurice Vandal, first award winner in the Little Rhody essay contest, with a \$300 scholarship. At left is William T. Nystrom, chapter chairman; and at the right is Gilbert Stafford, chapter educational chairman.

ASTE Executive Secretary Interviewed on TV

The future of automation, the field for engineering talent and the place of the tool engineer in industry were discussed on a Detroit television program January 8 by Harry E. Conrad, ASTE's executive secretary.

Interviewed by a panel of newspaper reporters and editors, Mr. Conrad was the guest participant on the "Press Conference" program, jointly sponsored by *The Detroit Free Press* and WXYZ-TV.

He predicted technological development in the field of manufacturing will result in a shorter working week and in lower prices for manufactured products. The job of the tool engineer is to find ways to produce a desired product as economically as possible. That is particularly true in highly competitive fields, such as the automotive industry, he added.

Automation, Mr. Conrad said, is far from new and its impact is gradual. Problems it brings in the field of employment can be solved as they arise, he indicated.

Little Rhody Awards Three Scholarships

Presentation of awards in its educational essay contest highlighted the January 6 meeting of Little Rhody chapter at Johnson's Hummocks. The three top winners were given cash awards to be spent in furthering their education as tool engineers. Society President Joseph P. Crosby made the presentation of awards.

Maurice Vandal, a three-year drafting apprentice at Brown & Sharpe Manufacturing Co., received the first award of \$300. Second and third place winners, both from the Rhode Island School of Design, were Frank A. Lukasik and Albert Stabile. They received \$200 and \$100 respectively. Eleven runners-up were presented copies of the *Tool Engineers Handbook*.

Guest speaker at the meeting was Arthur S. Reseigh, financial and business writer for the Providence Journal.

—Richard Kilbane

Niagara Speaker Talks on Automatic Screw Machines

Technical speaker at Niagara District's January meeting was F. Sparrow of Brown & Sharpe Manufacturing Co., Providence, R. I. He spoke on "Automatic Screw Machines and Tooling Applications". The session was held at the Queensway Hotel at St. Catharines.

—E. A. Lindwall

Powder Metallurgy Topic of Los Alamos Meeting

"Powder Metallurgy" was the subject of a technical address given at the January 12 meeting of the Los Alamos chapter at the Little Theater. Guest speaker was Martin Pogi, installation engineer for Kwikset Locks, Inc., who brought a film on powder metallurgy. It showed the steps in product design, material, specifications, tooling requirements and manufacture. Products were displayed and questions of cost, hardenability, permeability and specific applications were discussed.

Los Alamos chapter reports that it participated in a carnival along with other civic-minded organizations to raise money for the local March of Dimes. Booths and concessions included ring toss, shooting galleries, rat races and calf-roping. Many of the details of the event were in the hands of Chairman J. J. Von Steeg, with assists by Bob Kee, Bob Cramer, Gordon Anderson, Gerald Rogers and Basil Boss. The carnival is estimated to have put approximately \$1500 in the March of Dimes coffer.

—Basil Boss

Rochester ASTE Members See DoALL Exhibit

Meeting at the Barnard Exempt Club, members of the Rochester chapter heard a talk by C. G. Schelley, managing director of DoALL's Wilkie Foundation, on the firm's traveling exhibit "Civilization Through Tools." He described phases of man's evolution with tools, telling how man's survival, his development and material welfare are considerably dependent on tools.

—Paul A. Bruno



WORCESTER PROGRAM—A talk on "Die Casting and the Tool Engineer" was given January 4 by D. U. Stevens, seated at far left, sales engineer for Doehler Jarvis Corp. Others pictured are: A. T. Kosciusko, chairman; L. P. Tarasov, secretary; Andrew Peterson, treasurer. Standing: J. E. Rotchford, National Standards Committee; J. I. England, first vice chairman; Richard Smith, National Director; and G. L. Gershman, entertainment chairman.—John C. Lalor

Hamilton District Has Electronics Program

The January 14 meeting of the Hamilton District chapter featured a program on "Electronics at Work." An audience of 71 heard the guest speaker, Eric L. Palin, director of the School of Electronics and Electrical Technology, Ryerson Institute of Technology, in Toronto.

Mr. Palin traced the growth of electronics business in Canada over the past 30 years, and related historical facts about the pioneers in the field. He also reported on some of the present-day developments such as colored, third-dimensional stereoscopic sound television and visual telephone conversations.

—G. W. Hawkes

G. C. Brown Discusses Ultrasonic Machining

A record attendance of 130 Syracuse members was on hand January 11 for a talk by George C. Brown, sales engineer with Sheffield Corp. He spoke on "Ultrasonic Machining of Hard Materials."

Mr. Brown presented the historic background, research and development of the process as well as production applications of a high precision machine tool. It was interesting to note that by ultrasonic vibrations plus abrasive grit bombardment, this machine can perform such operations as cutting, engraving and embossing in any type of metal—hard or soft, including carbides, glass or any type of ceramics.

Slides revealed in detail the construction of this machine and showed its various applications.

At the chapter's December meeting, W. A. Barnes, vice president of Utica Drop Forge and Tool Corp., presented a talk on "Progress in Koldwelding."

—Andrew A. Lachner

T. G. Fechnay Dies

T. G. Fechnay, past chairman and a charter member of the Hamilton District chapter, died recently. Mr. Fechnay was a prominent figure in the machine tool and small tool fields and had been associated with the John Bertram & Sons Co., Ltd., of Dundas, Ont., for some 50 years. He held several executive positions, including that of works manager from 1940-47, and district sales manager from 1947-52. For the past two years he was district manager of the Hamilton office of Acme-Bertram Co., Ltd.



SEATTLE TOUR—Facilities of Sicks Brewing Co. were visited in December by 35 members of Seattle chapter and their wives. The tour was concluded with a party. Host for the evening was David McClean.—H. F. Hanson

Films Featured at Twin Cities Meeting

Three films—on jig boring, die casting, and automation—made up the technical program at the January meeting of the Twin Cities chapter. The session, held at the Covered Wagon, was attended by 175 members and guests.

The film on die casting was shown through the courtesy of the Twin City Die Castings Co. Produced by the American Zinc Institute in cooperation with the American Die Casting Institute, it showed both hot and cold-chamber die casting machines, and explained die cavities and ejection pin locations.

The automation film was on the transfer machine developed by Greenlee Bros. & Co. and illustrated boring, face milling, drilling and tapping operations performed by this machine.

Construction and inspection of parts that go into a jig borer were illustrated in the movie on jig boring produced by Pratt & Whitney.

—Walter J. Comstock

F. R. Springer Speaks at Northern Massachusetts

A program on "Oil Hydraulics on the Production Line" was presented at the January 18 meeting of the Northern Massachusetts chapter. Films on various types of work produced by machines built by Denison Engineer Co. were shown by Francis R. Springer, sales engineer, who also conducted an active question and answer period.

The meeting, held at Lithuanian Hall at Athol, was attended by nearly 100 members and guests. —Otto S. Nau



NEW HAVEN MEETING—Shown at the January tour of Crucible Steel Company's new warehouse, from left, are: Fred Dawless; John Brozek, chapter chairman; Dwight Kaufman, speaker; and Emanuel Lull.

Impact Grinding Topic at Merrimack Valley

A discussion of "Impact Grinding with Ultrasonic Machine Tools" was featured at the January 6 meeting of Merrimack Valley. The program was presented by Burton B. Stuart and Ralph M. Moschella of the Equipment Marketing Div., Raytheon Manufacturing Co., Waltham, Mass.

Mr. Stuart gave a brief outline of Raytheon's development of the new method of machining hard and brittle materials, such as carbide, hardened steel, glass, semiprecious stones, and ceramics. Mr. Moschella's talk was supplemented by a series of slides showing some of the typical applications.

The meeting, held at Andover Country Club, was attended by 60 members and their guests. —Ralph L. Draper

New Haven Visits Crucible Steel Co.

A group of 175 New Haven members and guests visited the new warehouse of Crucible Steel Co. of America on January 13 for a smorgasbord supper and a technical program.

Speakers were Dwight Kaufman, sales manager of Rem-Cru Titanium, Inc., who talked on machining and working of titanium, and Royce Strickland, chief engineer of Geometric Tool Co., who discussed self-opening die heads and collapsing taps.

—James T. Kalleher

San Antonio Awards ASTE Service Pin

James Metcalf, first vice chairman of San Antonio chapter, was presented with an ASTE service pin at the January 12 meeting in recognition of his fine work in the organization of the chapter. The award was made by Chairman E. Measels, Jr.

Guest speaker at the meeting was Alfred R. Sparrow, director of sales promotion, Brown & Sharpe Manufacturing Co., Providence, R. I. Some 55 members and guests heard his discussion of "Automatic Screw Machines and Tooling Applications" which was illustrated by a 16 mm film.

—Stanley G. Gower

Appointment Announced

G. L. Runkle, vice president in charge of engineering, Superior Coach Corp. of Lima, has announced the appointment of M. L. Niece as superintendent of tooling. Mr. Niece, a member of the Lima chapter, has been with Superior Coach for nine years acting in several capacities, the latest being chief inspector.



MERRIMACK VALLEY SPEAKER—Shown at the January 6 technical session, from left, are: Harry Clements, chapter treasurer; T. D. Monson, constitution and by-laws chairman; R. M. Moschella, program speaker; R. I. Robbins, chairman; B. B. Stuart, speaker; and F. T. Goodwin, Jr., first vice chairman.

H. L. Tigges Speaks at Louisville

H. L. Tigges, past president of ASTE and executive vice president of Baker Brothers, Inc., was the guest speaker at Louisville chapter's first Executive Night.

The meeting, attended by 150, was held in the Seelbach Hotel with a reception in the Leather Room and dinner and talks in the Plantation Room.

The special guest list included: Howard C. McMillen, second vice president of ASTE; Edward W. Ernst, manager of machine tools, Appliance Park, General Electric Co.; and John R. Carpenter, president, Louisville Chamber of Commerce.

Mr. Tigges address was entitled "Competition and Prosperity." Mr. Carpenter addressed the group on Louisville's Progress, in his capacity as president of the Chamber of Commerce.

—Sam T. Gleaves

Kenneth N. Hoff Speaks at Schenectady Meeting

A talk on tool and die salvage welding was given January 10 at a meeting of Schenectady chapter. Presented by Kenneth N. Hoff, regional sales manager for Eutectic Welding Alloys Corp., the discussion was devoted to Eutectic's low temperature welding alloys on tool and die salvage.

They minimize or completely eliminate the dangers that conventional high heat rods invite, such as warping, distortion, stresses, embrittlement, etc., the speaker said. The new type welding rods and electrodes are based upon the principles of surface alloying, giving superior bonds at temperatures far below the melting point of the base metals, thus saving time, money and materials.

—George S. Nelson



Prof. George B. Thom, center, speaker at Northern New Jersey's January meeting, is shown with Chairman H. Wilson Ryno, left, and W. K. Perry, education committee chairman.

Award Announced by Northern New Jersey

To give recognition to an outstanding senior student at Newark College of Engineering for a well executed project in the field of tool design, the education committee of Northern New Jersey chapter announced at a recent meeting that arrangements have been completed to present an education award at a chapter meeting prior to graduation ceremonies for the class of '55.

In addition, the name of the award winner will be listed in the commencement program of the Newark school.

Candidates for the award, which will consist of a *Tool Engineer Handbook* and appropriate membership in ASTE, will be undergraduate students in mechanical engineering. Judging will be in the hands of a committee of instructors named by the college.

On January 11, chapter members heard a discussion by Prof. George B. Thom, chairman of the mechanical engineering department at Newark College of Engineering. He spoke on "What Colleges Can Do for the ASTE." The meeting was held at Hotel Robert Treat.

—Walter R. Wunderlich



RIVERSIDE PROGRAM—A film entitled "Tracer Control in Action" was presented on January 4 by James Gorton of Gorton Co. and Seaboard Machinery Co. Shown here at the speakers' table, from left, are: Paul Jones (partially visible in back of man in foreground), Santa Ana chapter chairman; Mr. Gorton; Evans Porter, Seaboard Machinery; Pat Curley; Leon Bohrer; James West; and James Rust, constitution and by-laws chairman for Santa Ana Valley chapter.—A. A. Wilcox

Cincinnati Chapter Hears J. C. Hebert

J. C. Hebert was the guest technical speaker at Cincinnati chapter's January 11 meeting. Mr. Hebert, manager, Machine Tools Division of Jones & Lamson Co., Springfield, Vt., spoke on "Carbide High-Velocity Turning." The subject matter dealt with his company's success in achieving surface cutting speeds up to 1400 feet per minute on certain production jobs through careful control of tool rake angles, coolant directional flow, and rigidity of the machine.

Newly elected officers of the chapter who were chosen at the meeting are: chairman—John H. Elfring; first vice chairman—Dr. Max Kronenberg; second vice chairman—Moler Duff, Jr.; secretary—Julius Steinhoff; treasurer—Broadus Rusk; national delegate Joseph C. Maezer; alternate delegate—Richard Niebusch; and second alternate delegate—W. J. Fredericks.

—Frank H. Houston

Program on Drilling Given at Springfield

Springfield, Ill., ASTE members heard two talks on "Drilling, Tapping and Designing Jigs for Multiple Spindle Drilling" at the chapter's January meeting. Speakers were Francis Carroll and Robert Bayless of Peoria Tool and Engineering Co. who presented the program for Frank Zagar, Zagar Tool Co., Cleveland. Mr. Zagar was unable to make train connections because of a freight wreck outside of Chicago.

A film on die casting was shown before the talks. The meeting attracted an attendance of 60 members and guests from a radius of 120 miles from Springfield.

In December, the chapter held its Christmas party with 166 persons attending. The program, including dinner, dancing and a floor show, was arranged by E. J. Kane and his committee.

—Charles Collier

Calumet Area Members Discuss Roll Threading

"Roll Threading" was the topic under discussion at the January meeting of the Calumet Area chapter, attended by 127 members and guests. Speaker was Clifford T. Appleton, vice president of Reed Roll Thread, Worcester, Mass.

Mr. Appleton outlined early methods of roll threading and its advantages. Among its advantages are: greater strength, harder surface and smoother surface.

—L. W. Montgomery

Baltimore Chapter Ears W. L. Healy

Baltimore chapter's regular monthly meeting was attended by 100 members and guests on January 5 at the Engineers' Club. Guest speaker for the evening was W. L. Healy of General Electric Co. who spoke on "Value Consciousness in the Drafting Room." Mr. Healy is also president of the Standards Engineers Society. His talk was an appeal for simplicity and clarity of blueprints. A special guest was Carl Kertesz, area captain of the National Membership Committee.

The Engineers' Club was scene of another very special event for the Baltimore chapter on December 22. Fifty children and some 35 adults attended the annual children's Christmas party. The most important guest was Santa, himself, played by Donald Wernz, member of the National Editorial Committee as well as past chairman of the Baltimore chapter. Bill Stokes, an affable magician, had the whole group mystified and delighted, as did films of Felix, the Cat.

—Neil Heller



BOSTON SPEAKER—Malcolm F. Judkins of Firth Sterling, illustrates a point in his talk to the Boston chapter.

Malcolm F. Judkins Speaks at Boston

Guest speaker at the January 13 meeting of the Boston chapter was Malcolm F. Judkins, manager of the New Products Div. of Firth Sterling, Inc. An audience of 200 ASTE members and guests at the Museum of Science were on hand for his talk on "Modern Machining Techniques."

Mr. Judkins discussed the carbide family of cutting tools, giving a history of the discovery by a Frenchman around 1860 and covering present day uses.

Special guest of the evening was Richard A. Smith of Hartford, a national director of ASTE. He gave a brief talk on the growth and future of ASTE.

—Evo P. Castelli

Carbide Cutting Tools Is Topic of Panel

San Fernando Valley's January technical session was highlighted by a four-man panel discussion on carbide cutting tools.

Participating were: Ray Mack, Pacific manager for Carbolyt Dept., General Electric Co.; A. A. Morris, district manager, Kennametal, Inc.; Frank Rayburn, chief tool engineer, Menasco Mfg. Co., and San Fernando chapter member; and Carl Wesanan, shop foreman, AiResearch Manufacturing Co. Moderator was Keith Griffin, first vice chairman of the chapter.

Before the discussion got underway, a song film on research in the field of high velocity turning was shown by Frank King, Germain Machine Co., and J. T. Anderson, Jones & Lamson Machine Tool Co.

—A. J. Soares

Muncie Speaker Presents Talk on Diesel Engines

J. W. Rowell addressed 45 members of the Muncie chapter at the group's January 4 meeting. He is supervisor of technical sales information for Cummings Engine Co., Columbus, Ind.

Program topic was "Recent Diesel Engine Developments" and it covered engineering, construction, testing and running of the Cummings diesel engine race in the 1952 Indianapolis race.

—Darrell Marks

New Members for ASTE Book Committee

Francis J. Sehn, chairman of the National Book Committee, has announced two new appointments to the Committee. They are George De Groat, associate editor of American Machinist; and Richard B. Thornton, manager of the machining process dept., manufacturing staff of the Ford Motor Co.

Mr. De Groat is a graduate of Stevens Institute of Technology with a degree in mechanical engineering. His wide background includes experience as machine designed at Crocker-Wheeler Electrical Manufacturing Co. in Ampere, N. J.; chief tool engineer at Henry L. Crowley Co. in West Orange, N. J.; plant manager at J & S Tool Co.; and chief engineer for Michigan Powdered Metal Products Co. of Northville, Mich.

Mr. De Groat received his engineering training at Detroit Institute of Tech-



De Groat



Thornton

nology and Wayne University. He started with the Ford Motor Co. as an apprentice draftsman and later was process engineer and tool design leader on various defense jobs including the B-24 Bomber and T-48 Tank during the war. After the war he was with the production engineering department processing chassis and engine parts. When the overhead valve engine program came into existence in 1950, he was made supervisor of the planning and coordination section, a position which he held until his appointment as manager of the machining process dept.



LOS ANGELES DINNER DANCE—The Los Angeles Christmas Dinner Dance, held at the Deauville Beach Club, Santa Monica, was attended by 340. First row, from left, are: William Winquist, Paul Lenk, Frank Bale, Ralph Chrissie, Paul Slater and Eddie Riddle. In the second row are: Ollie Smith, Tony Peck, George Tilden, Carl Almquist, Vernon Sells, Art Lewis and Al Beaumont.—Ralph Chrissie



RACINE INSTRUCTORS—In cooperation with the Racine Vocational School, these four ASTE members are instructing students on hydraulic problems and circuits involved in their apprentice courses. Pictured from left are: Robert Monfeli, Charles Nelson, Dick Meekma and Charles Breitsprecher.

Ultrasonic Machining Discussed at Springfield

George C. Brown, sales engineer for Sheffield Corp., addressed 135 members of the Springfield, Mass., chapter at the group's January 10 meeting. Subject of his talk was "Ultrasonic Machining of Hard Materials." Member interest in the discussion of machining brittle materials, such as ceramics, diamonds and quartz, was proven in the lengthy question and answer period which concluded the program.

Special guest at the meeting was ASTE Area Captain W. H. Gourlie who presented a brief talk on Society membership and plans for the coming year. A film produced by United Airlines and narrated by James Banning was shown before the technical session.

—George H. Foy

Glen Stimson Addresses Portland, Ore., Meeting

"New Unified Screw Threads, Taps and Threading" was discussed January 20 by Glen H. Stimson, chief engineer, Gage Div., Greenfield Tap & Die Corp., at a meeting of 70 Portland, Ore., members.

Another highlight of the meeting was the welcome to the chapter's 100th member, Edgar W. Robison, extended by Chairman Fred Mondin. Announcement was made that all visitors to the Western Industrial Exposition are cordially invited to swing up to Portland to attend the chapter's March 24 meeting and installation of officers. A talk on publicity was given by Walter Brenneke.

—Walter Brenneke

North Texas Hears About New Welding Procedures

Victor H. Lyon, divisional sales manager for Eutectic Welding Alloys Corp., was the featured speaker at the December meeting of the North Texas chapter. He gave a discussion on the many different types of welding rods, their unique application, and new welding procedures being developed by his company. The program included a film and a discussion period.—R. E. McMahan

Detroit Member Passes State Engineering Exam

Robert W. Reinhardt, Detroit ASTE member and quality control analyst for the Ford Div., Ford Motor Co., recently passed the Michigan state examination for becoming a professional engineer. He is a member of the Engineering Society of Detroit, American Society of Mechanical Engineers, Society of Automotive Engineers, Tau Beta Pi, and American Society for Quality Control. ASTE chapter offices he has held include those of assistant program chairman and education chairman.

Madison Members See Film On How Files Are Made

A program entitled "Files on Parade" was presented at the December meeting of the Madison ASTE chapter. Speakers were Albert Thomas and J. E. Conrad of Heller Bros. Co. Part of the evening was devoted to a film showing the manufacture of files.

Coffee speaker was Ralph Rosenzweig, officer from Truax Field.

—Lyding A. Havey

Pittsburgh Attorney Discusses Patents

Elmer S. Utzler, mechanical engineer and member of the law firm, Christy, Pardee & Strickland, used his versatile background in the fields of law and engineering to deliver an informative talk on "Patent Facts" at Pittsburgh's January ASTE meeting. About 70 persons were present at the session held at the Sheraton Hotel. An extended question period proved the high member interest in the subject.

—Edward L. Caughey

John Gall Speaks to Evansville Members

Guest technical speaker at Evansville chapter's January 10 meeting was John Gall, sales and development engineer for Model Trimmer, Inc. of Columbus, Ind. He gave a talk on the Model Trimmer Machine, which, according to Mr. Gall, will successfully square trim all four vertical walls of a drawn stamping in one operation. He illustrated his talk with slides and a miniature working model of the machine. A special guest of the chapter was William O. Hartrup of Wm. O. Hartrup & Son, Inc., Columbus, Ind., who originated the Model Trimmer. Both Mr. Gall and Mr. Hartrup are members of the Indianapolis ASTE chapter.

—William H. Brooks

Die Castings Subject of Racine Program

A discussion of "Die Castings—Molten Metal to Finished Part" was given for 92 members of the Racine chapter at their January 3 technical meeting. Speaker was Arthur W. Peck, owner of Peck Industrial Products Co., Milwaukee.

After showing a film produced by the American Zinc Institute, Inc., Mr. Peck covered the history of die casting and then discussed problems presented from the floor by members in attendance.

A special feature of the meeting was the awarding of the chapter's \$100-scholarship to Donald Bohn. The presentation was made by Byron Peterson, chairman of the education committee.

—Alvin J. Michna



BATTLE CREEK PROGRAM—Dr. Hubert J. Pessl, assistant works manager for the Defense Products Div. of Gibson Refrigerator Co., was the guest speaker at Battle Creek's January meeting.

Battle Creek Members Hear Dr. H. J. Pessl

"Cold Extrusion of Steel" was the topic Dr. Hubert J. Pessl chose to discuss before 67 members of the Battle Creek chapter at their regular meeting on January 10. Dr. Pessl, assistant works manager at Defense Products Div. of Gibson Refrigerator Co., Greenville, Mich., outlined the history and development of the process, techniques used and the problems involved. Slides and extruded samples were shown.

The nominating committee suggested present officers continue for another year, but Second Vice Chairman Warren Reed and Treasurer Richard Lawrence declined. Robert Hess was nominated for treasurer, and C. G. Holdbridge was nominated for second vice chairman.

—Arthur F. Damon

Chicago Chapter Talk Given by Hautau

Charles F. Hautau, vice president and chief engineer of Hautau Engineering Co. of Detroit, was the principal speaker at the Chicago chapter's most recent meeting. Mr. Hautau presented a lecture on "Automation and What Is Its Potential?" before 200 members and guests at the Keymen's Club.

Using an unique method of supplementing his talk with freehand sketches while speaking, he showed various comparison on how automation has cut labor costs and at the same time improved the item being manufactured. A colored film, illustrating various automation applications, was also shown.

—R. C. Berliner

Positions Available

MACHINE TOOL AGENTS OR DEALERS WANTED—exclusive territories in Indiana, New York, Wisconsin, Minnesota, Pennsylvania, Iowa and other states open for agents or dealers who have present following on other tools or related industrial lines.

You can capitalize on the reputation already established, of such German-built machines as Lindner Jig Borer, Bokoe Mills, Hurth Mills—as well as the good name of Kurt Orban Service. Give full details when writing for an interview to Machine Tool Department, Kurt Orban Co., Inc., 34 Exchange Place, Jersey City 2, N. J.

TOOL ENGINEER—Must have experience in designing dies and related tooling for zinc die-casting machines. Permanent in non-defense industry. Established growing company in Southern California. Outstanding employment benefits. Salary commensurate with experience. Prefer automotive experience. Write resume of age, education and experience to Personnel Department, Kwikset Locks, Inc., 516 E. Santa St., Anaheim, Calif.

DIAMOND TOOL SALES REPRESENTATIVES—Several exclusive territories still available for manufacturers representatives or salesmen now calling on industrial houses. Highest commissions. Write fully in strict confidence to Box 024, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

RESEARCH ENGINEER—to take charge of advance research, design and development work on precision cylindrical grinding equipment. Must know fundamentals of electronic, hydraulic and cam-activated controls. Must be thoroughly grounded in machine tool design, assembly and operation and be able to develop ideas into practical applications. Modern plant, location mid-Atlantic state, small town. Salary over \$12,000. Write to Box 025, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

CARBIDE SERVICE ENGINEER—Lifetime opportunity with progressive carbide manufacturer. Work with representatives. Travel approximately one week out of three. Salary commensurate with experience and ability. Send detailed resume and snapshot, if available. Write to Box 028, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

MANUFACTURER'S AGENT—wanted to handle line of additives and base compounds for metal cutting lubricants. Sales potential, all industries using cutting tools. Manufacturer long established with domestic and export sales. Write to Box 030, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

ABRASIVE ENGINEER—to head up basic research and development of abrasive products used by machine tools on precision machining. Must have background in surface grinding techniques, surface finishes and speeds and feeds of abrasive wheels for various applications. Required also is knowledge of grits, bonding materials and wheel forming techniques. Newly constructed plant and laboratories located in medium sized mid-western city. Salary over \$10,000. Write to Box 026, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

Positions Wanted

CHIEF PRODUCTION ENGINEER—Now employed successfully as chief production engineer of medium size firm with responsibility for and excellent results in initiating and executing a manufacturing engineering program with emphasis on cost reduction; supervises efficient departments of process engineering, tool engineering, industrial engineering, tool room and tool control. I have a working knowledge of production planning and control, quality control, plant engineering and cost accounting. Have excellent background and experience in modern precision manufacturing process methods, processes, tooling, organization and procedures as supervisor, manufacturing engineer, tool engineer and job shop tool and die maker. Some college; age 34; salary and location open. Complete resume on request. Write to Box 031, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

TOOL AND DIE MAKER—former Canadian tool and die maker would like position Niagara Falls, Galt, Kitchener area. My experience metal stampings, model work and some tool design. Write to Box 027, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

INDUSTRIAL REPRESENTATIVE—Past chairman of Canadian chapter, age 39, widely connected with 20 years industrial background. Present position works manager. Previously acted successfully as sales manager, production manager, project engineer and purchasing agent. Now interested in representing progressive American manufacturer of industrial equipment in Canada. Write to Box 023, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.

TOOLMAKER—British, 3 years in Canada, age 40, seeks position in mid-west America or California. Write to Box 029, News Department, The Tool Engineer, 10700 Puritan Ave., Detroit 38, Mich.



PORLAND, ORE., OFFICERS—Shown here, from left, are: Fred Allen, first vice chairman; Andrew Winters, second vice chairman; Walter Brenneke, editorial and publish relations; Robert Stone, secretary; and Robert Erickson, treasurer.

Saginaw Valley Presents Four Education Awards

One-year student membership in ASTE were presented to four students at General Motors Institute by the Saginaw Valley chapter at its January 20 meeting. Recipients were: Robert J. Johnson, Roland C. Johnson, James L. Miller and Thomas De Agostino.

The technical program was given by C. R. Alden, research engineer and chief of the patent department at Ex-Cell-O Corp., Detroit. He spoke on "Patent Law and Tooling." An audience of 250 members and guests attended the meeting.

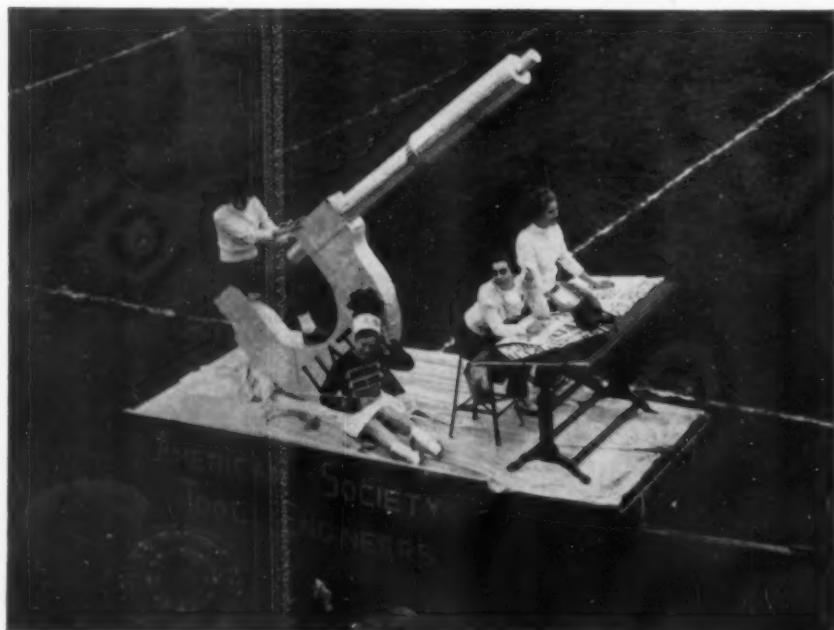
Mr. Alden defined a patent as a property right in creative work which is granted by the federal government to encourage and stimulate progress

and invention. It consists of the exclusive right to use, produce, sell or license the subject matter for 17 years.

Outlining the three integral parts of a patent—description, drawings, and claims, Mr. Alden explained that the claims are the heart of the patent, distinguishing what is new and different from other patents and the known or common art.

The claims, not the description or drawings, define or determine the patentee's property right. Mr. Alden emphasized that great care and thought should be given to the writing of the claims if the patent is to be of maximum value.

—Robert J. Irvin



LONG ISLAND STUDENT SECTION—A float made by the members of the Long Island Agricultural and Technical Institute student section was part of the school's homecoming parade between halves of the football game.—Eugene R. Kelly

Kansas Students Hear W. B. Worthington

Speaking at the January meeting of the University of Kansas student chapter, W. B. Worthington of Haynes Stellite Co. told about the materials and methods of applying hard surfacing materials to tools and machines.

District sales manager for his firm, Mr. Worthington pointed out the various considerations to keep in mind when making a part ready for hard surfacing. Describing how assembly line techniques can be used in applying hard surfacing materials, he cited the materials best suited for certain specific jobs.

—Kenneth Crabtree

Industrial Noise Is Cedar Rapids Topic

"The Tool Engineer and Industrial Noise" was the subject of a talk given at the December 9 meeting of the Cedar Rapids chapter at Hotel Montrose. Walter F. Scholtz, supervisor of industrial hygiene at Allis-Chalmers Manufacturing Co. of Milwaukee, was the guest speaker.

Mr. Scholtz explained that compensation claims for loss of hearing comprise many millions of dollars. He talked about what can be done to lessen noise and said that the tool engineer was the logical person to lead in noise abatement.

—Robert J. Bloch

Coolants, Lubricants Discussed at Los Angeles

The January meeting of the Los Angeles chapter was devoted to a discussion of coolant and lubricants. F. E. Anderson, president, and A. W. Ackerman, chief chemist, of the F. E. Anderson Oil Co., were the guest speakers.

Mr. Anderson opened the program with a brief talk on the development of metal working fluids, and Mr. Ackerman carried on with examples of requirements for different types of coolants and lubricants. A film on the development of aluminum was shown after the presentation.

—John Boettgenbach

Retirement Announced

Gisholt Manufacturing Co. announces the retirement of U. S. James, Detroit sales office manager. Mr. James, a member of the Detroit ASTE chapter, retires after 42 years of service with the company.

Bernard Anschler Talks at Long Island Meeting

Guest speaker at the Long Island chapter's January 10 meeting, held at the Garden City Hotel, was Bernard Anschler, sales manager of Hydropress,



Anschler*

Inc. He gave an enlightening talk on the history of the Air Force heavy press program, discussing in detail problems arising in the design and installation of some of its enormous equipment. Mr. Anschler allowed the 120

members and guests present to preview a still unedited film showing phases in the design, manufacture and installation of the most recent addition to this country's heavy press capacity.

On January 19, the chapter's Carbide Committee held a panel discussion at the Long Island Agricultural and Technical Institute. Ray Parent of the Wadelle Tool Co. acted as moderator. The panel consisted of various carbide specialists from industry who drew from their experience in discussing carbide cutting with respect to machine feeds and speeds. —*Jerome Barfus*

Robert Kidder Addresses Buffalo-Niagara Chapter

Robert Kidder, flight research engineer for Cornell Laboratory in Buffalo was the guest speaker at the January 13 meeting of the Buffalo-Niagara chapter. The meeting, annual "Lockport Night", was held at the Park Hotel in Lockport, N. Y.

The speaker explained the general construction of sailplanes and the principles of soaring. He also related experiences he had while participating in the 5th International Soaring Contest held in Great Huckwell, England.

—*James W. Bowler*

Dayton Holds Annual Dinner-Dance

Dayton's annual dinner dance was held December 11 at the Miami Valley Golf Club with more than 220 members and guests present. Following the tradition of past years the meeting was an outstanding success.

The entertainment committee was headed by Francis Heberling, chairman, and he was assisted by Carl Eperly and Victor Boll.—*W. J. Killinger*



HOUSTON SPEAKER—John H. Dixon, guest speaker at Houston's November meeting, is shown at the head table with Howard Boswell, right, chapter chairman.

ASTE Director Outlines Exposition Program

Portland, Me., members learned about national activities of the Society and the scope of the program planned for the Western Industrial Exposition from Richard Smith, national director of ASTE. He spoke at the chapter's January 14 meeting held at Graymore Hotel.

Technical speaker at the session was Dr. Charles R. Austin, assistant to the president and director of research, Mechanite Metal Corp., who discussed the basic principles of heat treatment of ferrous materials with particular reference to iron castings.

—*Henry C. Hagman*

Tool and Die Salvage Topic at Grand River

The 45 members and guests of Grand River Valley chapter who met at Shep's Hall on January 7 heard a talk on "Tool and Die Salvage." The guest speaker was L. D. Richardson, technical sales and service representative of Eutectic Welding Alloys Corp. The program consisted of a preliminary explanation and showing of slides with elaborations of procedure dictated by shape of part and nature of breakage.

The nominating committee consisting of Jack Ward, past chairman; Dave McReady, past chairman; and W. C. Little, editorial chairman, are working a slate of officers to present at the next meeting.

—*W. C. Little*

Air Power Discussed at Binghamton Meeting

"Air Power" was the subject of a talk given by Harold P. Granger, eastern regional manager of The Bellows Co., Akron, Ohio, before 104 members and guests of the Binghamton chapter. The program also included a display of air cylinders and feed attachments, and a sound movie entitled "Operation Push Button." Mr. Granger discussed how air operated tools fit into automation programs.

The special guest list included James O. Horne of Rochester, N. Y., a national director of ASTE, who spoke on the current activities of the ASTE.

Election of 1955-56 officers was held and they are: chairman—Philip M. Taylor; first vice chairman—Wendell Harper; second vice chairman—Andrew Komar; secretary—Charles King; treasurer—Robert Carbrey; national delegate—David O. Williams; and alternate—Philip Taylor.

—*Paul J. Adamek*

P. F. Youngdahl Speaker at Fairfield Meeting

The Hitching Post Inn, Bridgeport, Conn., was the scene of Fairfield County chapter's January meeting at which Paul F. Youngdahl was the guest speaker. Mr. Youngdahl, director of research at Mechanical Handling Systems, Inc., Detroit, talked on "Automatic Materials Handling." He illustrated his presentation with slides.

The coffee speaker was R. C. McDonald, vice president of Homelite Corp., Port Chester, N. Y., who spoke on "History of the Chain Saw." Fifty-five attended the meeting.

—*Henry E. Busby*

Glen H. Stimson Golden Gate Speaker

Glen H. Stimson was the guest technical speaker for the Golden Gate chapter's January 19 meeting at Rickey's Red Chimney in San Francisco. Approximately 165 members and guests were on hand to hear Mr. Stimson's talk.

Mr. Stimson, manager of sales and chief engineer of the Gage Sales Division for Greenfield Tap and Die Co., described some of the work in which he is engaged, establishing Unified Thread Series with U.S. manufacturers and Western European nations. The film "Facts About Taps and Tapping" was also shown. —*Ernest H. Romine*

coming ASTE meetings

On-Campus Conferences

PURDUE UNIVERSITY—April 23, West Lafayette, Ind.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY—May 6, Boston, Mass.

MICHIGAN STATE COLLEGE—May 14, East Lansing, Mich.

UNIVERSITY OF HOUSTON—April 22, 23, Houston, Texas.

UNIVERSITY OF TENNESSEE—May 6, 7, Knoxville, Tenn.

Chapter Meetings

BATTLE CREEK—March 7, 6:30 p.m., American Legion Clubhouse. Installation of officers. "Management and the Tool Engineer" by Howard C. McMillen, national third vice president of ASTE, Bedford plant manager of Philco Corp.

BOSTON—March 3, 6:30 p.m., Woodland Country Club. Installation of officers and ladies' night. Speaker I. A. Williamson, production manager for Raytheon Manufacturing Co.

CEDAR RAPIDS—March 10, 6:30 p.m., Hotel Montrose. Installation of officers. "Single Point Tools" by Malcolm F. Judkins, Firth Sterling, Inc.

CENTRAL PENNSYLVANIA—March 2, Installation of officers.

CHAUTAUQUA-WARREN—March 17, Warren, Pa. Installation of officers. "Electronic Equipment for Industrial Machinery" by a representative of Machinery Electrification, Inc.

CHICAGO—March 18, 1 p.m. Plant tour of Bell and Howell Co., Lincolnwood, Ill.

CLEVELAND—March 11. Installation of officers and ladies' night.

COLUMBUS—March 9. Installation of officers by Andrew B. Clark, national director of ASTE, and ladies' night.

DENVER—March 8, 6:30 p.m., Cunningham's Rest. Installation of officers and ladies' night. Social entertainment by Robert Smith, coordinator of music, City and County of Denver.

ERIE—March 22, 6:30 p.m., G. E. Community Center. Joint meeting of ASTE, ASME and Instrument Society. "Instrumentation and National Bureau of Standards" by A. Wildhack.

GRANITE STATE—March 19, New City Hotel, Rochester, N. H. Installation of officers and ladies' night.

HAMILTON DISTRICT—March 10, Brant Hotel, Brantford, Ont. "Induction Heating for the Tool Engineer" by

Dr. Harry B. Osborn, Jr., national first vice president of ASTE and technical director of Tocco Div. of The Ohio Crankshaft Co.

HARTFORD—March 7. Installation of officers and ladies' night.

HENDRICK HUDSON—March 16, 6:30 p.m., Circle Inn, Latham, N. Y. Installation of officers. Coffee speaker Father Kuhn, S. J., of Siena College.

INDIANAPOLIS—March 3. Discussion on "Heat Treating of Tool Steels" by A. J. Sheid, chief metallurgist for Columbia Tool Steel Co., and E. J. Pavesic, director of research at Lindberg Steel Treating Co. Moderator Art Love, superintendent of Merz Engineering, Inc.

LEHIGH VALLEY—March 18, 6:30 p.m., Hotel Traylor, Allentown, Pa. Installation of officers.

ASTE Western Industrial Exposition and 23rd Annual Meeting will be held March 14 through 18 at Los Angeles, Calif. Headquarters hotel will be the Ambassador. The Exposition will be held at the Shrine Auditorium.

LIMA—March 17, 6:30 p.m., New Royal Pine Room. "Ultrasonic Machining of Hard Metals" by J. T. Welch, manager, Ultrasonic Machine Div., Sheffield Corp.

LONDON-ST. THOMAS—March 17. "Tool Steels" by Dr. Hamaker of Vanadium-Alloys Steel.

LONG ISLAND—March 5, 7:30 p.m., Garden City Hotel. Installation Dinner Dance.

LOS ANGELES—March 10. Installation of officers.

LOUIS JOLIET—March 15, 6:30 p.m., Woodruff Hotel. Installation of officers. "Precision Manufacturing, Past and Present" by Warren Getchell, consulting engineer, McCrosky Tool Corp.

LOUISVILLE—March 8, 6:30 p.m., L & N YMCA. Installation of officers. "Broaching Problems" by Tony Audino, branch engineer, Illinois Tool Works.

MONTREAL—March 16. "Tool and Production Grinding" by a representative of Canadian Carborundum Co., Ltd.

NEW HAVEN—March 10, 6:30 p.m., Hotel Garde. Installation of officers. Panel discussion "The Pressworking of Metal." John Brozek, tool engineer, Sargent and Co., moderator.

NORTHERN MASSACHUSETTS—March 15, 7 p.m., Greenfield, Mass. "Copper Brazing" by Lloyd E. Raymond, metallurgist, Singer Manufacturing Co.

NORTHERN NEW JERSEY—March 8, 8 p.m., Hotel Robert Treat, Newark, N. J. Executive night honoring Radio Corporation of America. Speaker John Gates of the Radio Corporation of America.

PHILADELPHIA—March 17. "Civilization Through Tools" by representative of DoAll Co.

PORTLAND, ORE.—March 24. Installation of officers. Talk by a representative of Kennsmetal Carbide Co.

SAGINAW VALLEY—March 17, 7 p.m., Hotel Zehnder, Frankenmuth, Mich. Past chairmen's night.

SANTA CLARA VALLEY—March 15. Installation of officers.

SCHENECTADY—March 14, 8 p.m., American Legion Post #21. "Automation and Parts Handling Equipment" by Charles E. Kraus, president Kraus Design, Inc.

SEATTLE—March 22. "Tooling for Automatic Welding" by Y. D. Gilbert.

SPRINGFIELD, ILL.—March 1. "Machining by Electronic Bombardment" by H. V. Harding, technical assistant to the president, Elox Corp.

SPRINGFIELD, MASS.—March 14, 7:30 p.m., Springfield Turn Verein. "Hydraulics as Applied to Industrial Machinery" by E. O. Clark, manager of industrial products sales, Vickers, Inc.

TRI-CITIES—March 9, 6:30 p.m., Rock Island Arsenal. "Welding."

TWIN CITIES—March 2, Vocational High School, St. Paul, Minn. "R. B. Interchangeable Punches and Dies" by Ray Wilds, of Allied Products Corp.

TWIN STATES—March 9, Springfield, Vt. Installation of officers and ladies' night.

WESTERN MICHIGAN—March 14, 7 p.m., Varsity Grill. "Denison Multipress" by Mel Sulser, manager of branch Chicago office of Denison Engineering Co.

WINDSOR—March 7, 6:45 p.m., Prince Edward Hotel. "Automatic Lubrication for Machinery" by M. J. Freeman, field engineer for J. N. Fauver Co.

Harry B. Osborn, Jr. Speaks at Houston

Guest technical speaker at the Houston chapter's January 11 meeting was Dr. Harry B. Osborn, Jr., first vice president of ASTE and technical director of Tocco Division of the Ohio Crankshaft Co. of Cleveland. The meeting was held jointly with the industrial group of A.I.E.E. at the Ben Milam Hotel in Houston.

Using slides to illustrate his talk, Dr. Osborn traced the history of induction heating from its application at his company to its highly developed automatic applications today in plants all over the world. Following the technical program, Dr. Osborn showed the group some pictures of Japan and Hawaii made with a new lens which he purchased in Japan.

On November 9, the chapter heard John Dixon of the Pratt & Whitney Div. of Niles-Bement-Pond Co. of West Hartford, Conn. His topic was "The Development of Precise Measuring." The film "The Pratt & Whitney Story" was also shown.

On December 10 the Houston held its annual Christmas dinner dance at the Golf Crest Country Club in Houston. Large attendance, turkey and broiled flounder dinner, and dancing 'til 1 a.m. made the evening a memorable one.

—*Virgil D. Ferguson*

Western Michigan Hears ASTE National Director

The future for tool engineers and the important role they play in the progress of the nation was emphasized by Charles M. Smillie, a national director of the Society, in a talk given January 10 at a meeting of the Western Michigan chapter. He also encouraged members to become active in the Professional Engineering Society.

Technical speaker on the program was H. T. Cousins, district manager for National Machinery Co., Tiffin, Ohio, who spoke on "Trends in Modern Forging." —*Jim Rost*

H. L. Murch Speaks on Optical Inspection

Southeastern Massachusetts members attending the December technical meeting were addressed by H. L. Murch, sales manager for the Optical Div., Jones & Lamson Machine Co., Springfield, Vt. His subject was "Optical Inspection." Announcement was made at the meeting that the chapter's total membership now stands at 169.

—*K. W. Nitel*



GOLDEN GATE SPEAKER—Glen H. Stimson, left, speaker at Golden Gate's January meeting, is greeted by Gustave Berlien, past chairman and a member of the National Editorial Committee.

R. W. Parker Speaks at Erie Meeting

Approximately 75 members and guests of the Erie chapter were on hand to hear Robert W. Parker, vice president of Parker White Metal Co. of Erie, Pa., at the January 4 meeting. The title of his talk was "Die Casting Construction and Lower Costs Through Die Casting," a discussion of die casting alloys and die casting design.

Other ingredients of the meeting at the G. E. Community Center were a smorgasbord dinner and a film on die casting entitled "How Else Would You Make It?" Chairman William Snook announced that the Erie Engineering Society Council, of which Erie ASTE chapter is a member, had voted and passed a motion to celebrate and support Engineers' Week.

—*Samuel A. Fiorenzo*

James O. Horne Visits Chautauqua-Warren

The January 20 meeting of the Chautauqua-Warren chapter at the American Legion Club in Warren had as its guest James O. Horne of Rochester, a national director of ASTE. He discussed national level activities, outlining programs in process and the benefits of membership.

Other guests included William Iekel, past chairman of Buffalo-Niagara chapter and also area lieutenant of the National Membership Committee; and Harvey W. Ellis, first vice chairman of Buffalo-Niagara chapter.

The technical session featured talks by E. L. Boersig, sales representative, and A. J. Maezer, service engineer, for the Carboloy Div. of General Electric Corp. The subject of the program was "Carbides, the Industrial Vitamin." Eighty-eight were in attendance.

—*Leslie H. Beau Jean*

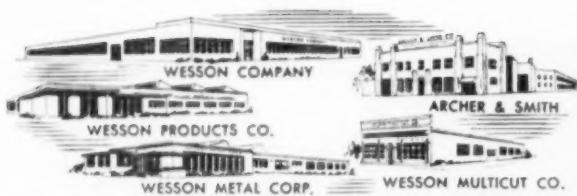
Aluminum Forming Is Indianapolis Topic

E. V. Sharpnack, chief forming engineer for the Reynolds Metals Co. in Louisville, Ky., presented a discussion of basic considerations in aluminum forming before 105 members and guests of the Indianapolis chapter on January 6.

Using both slides and films for illustration, Mr. Sharpnack discussed the limitations of forming various aluminum alloys and problems encountered in extreme draws. —*Murray Davidson*



HOUSTON JOINT MEETING—Members of the A.I.E.E. were invited to join Houston chapter for its January meeting. The head table reads from left: M. T. Robin, past chairman of A.I.E.E.; H. O. Traughber, past chairman Houston chapter; Dr. Harry B. Osborn, Jr., speaker, first vice president of ASTE and technical director of Tocco Div. of The Ohio Crankshaft Co.; H. G. Boswell, chairman; L. U. Eidson, A.I.E.E. chairman; M. L. Begeman, member of the National ASTE Education Committee; Homer Briggs; D. E. Mackenzie; and August Huge, Jr.



carbide NEWS

New "No Grind" Tools Cut Costs

Throwaway inserts and fully adjustable carbide faced chip-breakers among features of new Multicut line.

An entirely new series of Multicut tool holders for medium duty machining eliminates the need for all carbide grinding. Featuring a built-in carbide-tipped chip breaker with a wide range of adjustments for different machining operations, the new Wesson Company holders do away with another area of maintenance costs—the grinding of chip breakers.

Large front and side clearance angles are made possible by the new holders, permitting ready application on jobs not possible previously with mechanically-held, carbide insert holders.

Another feature of the new Multicut is the one-piece anvil-locator plate, with built-in relief to clear built-up edges. Extreme strength and hardness overcome "feather edge" problems, especially on the end cutting edge angles.

New →
Multicut for medium duty machining. Inset shows anvil and adjustable chip breaker-clamp.

Chip breaker requirements of a wide range of machining operations are met by the adjustable breaker-clamp, available as either carbide-tipped for steel turning or steel-faced for cast iron. Serrations on the breaker-clamp matching those on the heel of the anvil-locator provide a wide range of settings beginning .050" back of the cutting edge.



Is Carbide Grinding on Way Out?

We doubt it, but the vast increase in life of carbide inserts achieved in Wesson-metal carbides has made it uneconomical to regrind tips or inserts, in many applications. It has become far cheaper, in many cases, to throw away the inserts when all cutting edges have been dulled.

Facts on comparative costs on specific applications are available from Wesson Company direct or its staff of field engineers.

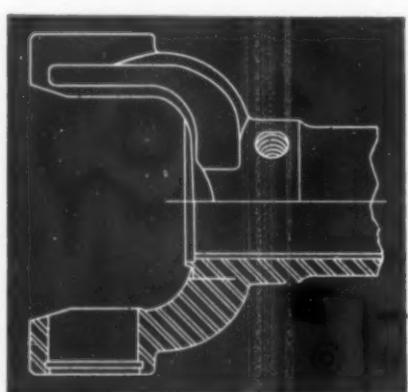
Shift to Wessonmetal Doubles Tool Life on Interrupted Cut

Production of automotive sleeve yokes on a job requiring a partially interrupted cut jumped from 137 to 300 pieces per grind at the plant of a midwestern manufacturer when a switch was made to Wessonmetal Grade WH and Wesson

BDR band-type Multicuts from the steel cutting carbide formerly used.

The job is being done on a Lodge & Shipley 2-A Duomatic at 632 rpm and 372 sfm with a 3/32" depth of cut and .018" feed.

Workpiece is a fine-grain SAE 1140 steel forging. The area being cut on the sleeve is partially interrupted by the lubrication fitting hole. Wessonmetal Grade WH overcame the resulting excessive chipping of the carbides formerly used.



Wessonmetal doubles tool life on interrupted cut machining of fine grain SAE 1140 steel forging.

CARBIDE DATA
Additional information and specifications available:
Illustrated booklet describing the mechanical features and application advantages of the entire Multicut line for medium duty and finish machining.
Get data by writing to:
WESSON COMPANY, Dept. AD
1220 Woodward Heights Blvd.
Detroit 20, Michigan

Wesson
tools
carbide
Wessonmetal

PROGRESS in production

TANK-AUTOMOTIVE STANDARDIZATION

IMPROVES PRODUCTION, MAINTENANCE

Savings of considerable proportions in production, transportation, maintenance, storage and training are cited by Ordnance officials as results of a large-scale standardization and interchangeability program. In a special press showing at the Detroit Arsenal, these results were demonstrated by an interchange of engines, auxiliary power units, and other components between different models of tracked vehicles. Other phases of the standardization program ranging from electrical components to protective coatings also were displayed.

By development of the idea of families of vehicles in both the tank and automotive field, a wide range of specialized combat and service vehicles has been produced that contains many common components, such as generators, spark plugs, batteries, hardware, bearings and wheels. The greatest standardization, of course, has been achieved within each group of vehicles. Production advantages include the responsibility of bringing more producers into the Ordnance field and lower item costs.

Commercial specifications and standards, established by engineering societies, have been adopted and integrated in Government specifications and standards when possible. Lists of products and manufacturers which have passed specification tests for off-the-shelf use are included in the standardization program. Thus, to assure ease of production as well as a broad production base, Ordnance departments are working closely with industry.

Important element of the production phase is the gaging program to insure interchangeability. Inspection gages are designed and used by Ordnance inspectors in manufacturing plants in order that all critical dimensions are held rigidly within design tolerances. To maintain this control requires special gages and a mobile gage laboratory

(THE TOOL ENGINEER, p. 62, Nov. 1952) is used to test the gages to be sure they are kept within gaging tolerances.

To illustrate its value a comparison was made between the Ordnance requirements for space parts for engines during World War II and the present time requirements. Whereas then 36,550

items were needed during the war period, the current list calls for only 8500—a reduction of 77 percent. Specifically in such high mortality parts, as pistons and pins, the reduction has been from 184 to 36; plain main bearings have been reduced from 344 to 36.

Combat effectiveness, which Ordnance officers point out has been the fundamental aim, has been increased by simplification of field maintenance and parts storage.



Medium tank of General Patton type with lower silhouette attained by torsion bar suspension. Its air-cooled engine and cross drive transmission are features of standardization-interchangeability program.

TEMPLATE MACHINE SIMPLIFIES

STRAIGHT AND HELICAL PATTERN MAKING

Automatic fabrication of templates is being accomplished with a tool designed by The Farnham Mfg. Div. of the Wiesner-Rapp Co., Inc. The tool, which will accurately turn out either a straight or helical contour template, incorporates a follower and cutter so related to the cutter and follower of a template-following machine that a given template contour is automatically trans-

posed with accuracy to the part contour.

Even tracings directly from sheet metal templates are possible because of the low follower pressure.

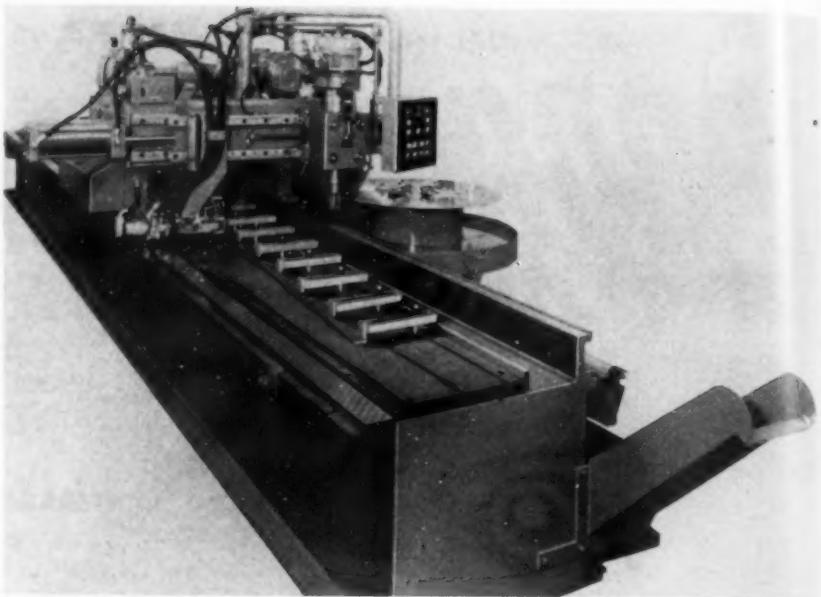
A further important advantage is that either straight or helical templates are produced with equal accuracy.

As a consequence of this development, involved calculations to determine cutter-to-follower offsets are un-

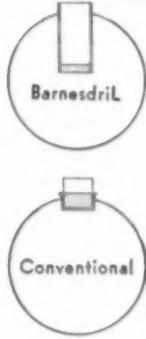
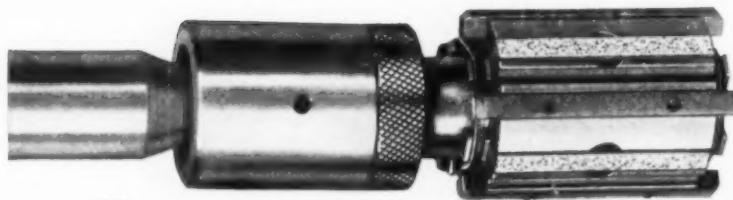
necessary. In addition, because the Template Maker cutter path automatically converts to the proper circular path when making helical templates; lengthy computations and layouts previously required are needless.

Although a precision instrument, the machine is so designed that setup can be made directly from engineering parts drawings either by means of a series of locating point units and clamps or by the loft method. In the former case, clamps secure a spline bar or overlapping straight bars to connect locating points; by the latter method, a full scale layout is placed on the fixture bed and the spline bar or overlapping bars are clamped on top of the layout.

As indicated, both straight and helical templates can be made from the same setup. Straight template blanks are secured to a raised support rail on the top of the bed; helical template



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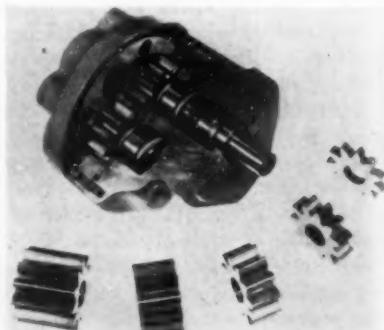
blanks are clamped to the rotating circular table, which is driven through a ring gear meshing directly with the rack on the bed. Movement of the carriage rotates the table at the same ratio to carriage travel as corresponding template holders on helical template spar mills.

GEARS FROM POWDER METAL

Successful application of powder metallurgy techniques to the production of high strength machine parts requiring the properties of solid alloy steel has been accomplished following a two-year project to develop high strength alloy steel gears fabricated by this process.

This first successful application was announced jointly by the three companies participating in the work: Vanadium-Alloys Steel Co., Keystone Carbon Co., and the Hydrex Div. of the New York Air Brake Co.

Vanadium-Alloys developed the 4650 steel powder, a prealloyed type made by water disintegration of molten metal. Fabrication of the steel powder into gears with tensile strength exceeding



100,000 psi, C-30 particle hardness, and greater resistance to wear than previously used (solid) gears was the job of Keystone Carbon. Hydrex carried out extensive tests of performance and durability, made the final application of the gear to its line of hydraulic pump equipment. Reports from that application indicate considerable cost savings plus superior characteristics.

Field tests and accelerated life tests were carried on over a period of two years to determine the performance characteristics of the powdered steel gears relative to the known performance of the cut steel gears formerly used. Performance of the new gears showed them to be at least equal to the cut gears originally used.

The uniformity of one gear to another, the superior finish on the teeth, the resistance to wear and their high strength were factors that led Hydrex to approve the gears for production.

Performance characteristics result from the properties of Vanadium's new prealloyed steel powder. The alloy content, for example, makes it possible to harden a thick section completely through, to provide a strong core as well as a hard surface.

Parts made from the prealloyed steel powder respond to heat treating in the same manner as parts made from bar stock having the same chemical analysis. This characteristic makes it possible to produce high tensile strength parts over a range of density. Parts molded from the new powder have good green strength, permitting automatic handling prior to sintering. The molded parts do not decrease in size beyond controllable limits during sintering.

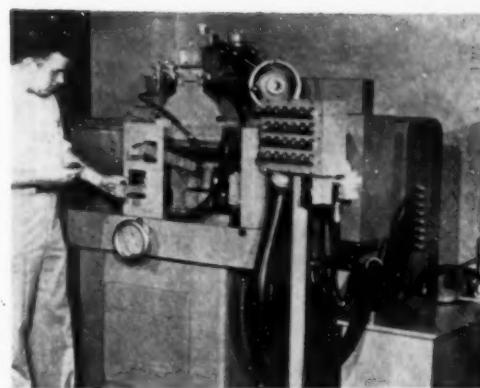
ECONOMY PLUS QUALITY FROM SPECIAL GRINDER

Special automatic grinding equipment developed by The DoAll Co. solved the problem of economical production of rotors for power steering pumps. Machine designed for this work, the "rotor grinder," utilizes the company's basic grinder design plus automatic fixturing to handle these parts. Twelve slots in the rotor hold the vanes. Rotors are used in vane-type pumps for automotive power steering and power braking. Because of the quality of fit required for pump efficiency, a lapped finish is desirable. However, finishing milled slots by lapping is economically impractical, so plunge grinding on an automatic basis is utilized.

Prior to the grinding operation, slots of the rotors are milled; the rotor is hardened to 61-62 Rockwell C; and the rotor faces are lapped to achieve proper part thickness and finish. Slots, then

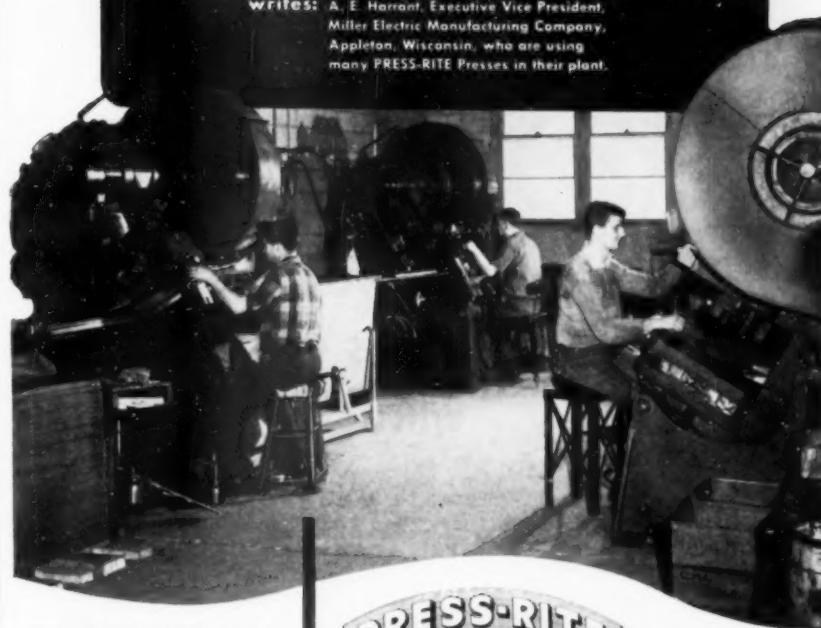
finished on the grinder, are held to 0.078 in. plus 0.0005, minus 0.00000 with a resulting surface finish of 5 to 10 microinches rms.

Rotors are hopper-fed to the grinding wheel. Each slot is indexed in turn and located so that its exact center is aligned under the center of the wheel face. Equal amounts are ground from both walls as the wheel makes its rapid plunge to finish the slot. Thus, pressure and wear on both sides of the wheel are equalized, affording better control of wheel, and consequently of slot dimension. Because of this opera-



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A. E. Harrant

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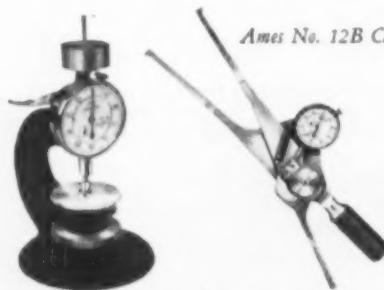


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tion, spacing of slots during the preceding milling operation is not critical. When the twelve rotor slots have been ground, the finished part is ejected.

The tool incorporates an automatic diamond wheel dresser that dresses the wheel after twelve slots of each rotor have been ground. In addition, the column is lowered automatically to compensate for wheel depth lost in dressing.

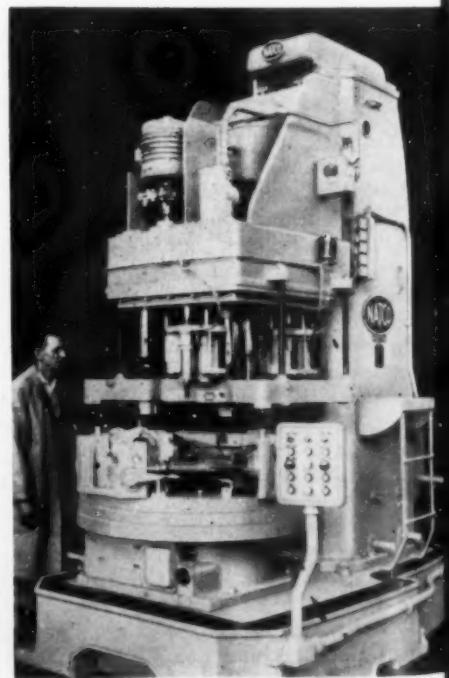
In operation, the grinder, once started on its automatic cycle, continues to lower the grinding wheel in desired increments to the limit established by an adjustable stop. Downfeed increment, in the "automatic downfeed" arrangement, is adjustable from 0.0002 to 0.080 in. and can be arranged to take place at one or both ends of the table stroke.

Production rate in this operation is 1248 vanes per hour. Simplicity of operation is an advantage of the automated grinder. It was found that an inexperienced operator can turn out acceptable work almost immediately.

HEAVY-DUTY DRILLER-TAPPER

Twenty-seven transmission rear bearing retainers are drilled, reamed, spot faced and tapped in an hour with 85 percent efficiency with the heavy-duty vertical Holesteel combination driller developed by National Automatic Tool Co.

The machine is provided with a four-position fixture, mounted on an eight-position indexing table, and arranged to accommodate two parts in different locations in each position while performing the multiple operations.



The Tool Engineer

TOOLS of today

Boring and Turning Mill

Latest design in double-column vertical boring and turning mills, made by Froriep, of Rheydt, Germany, features high cutting capacity, precision production and easy operation. These mills, which are designed to do roughing and finishing operations on the single unit, are manufactured in standard sizes from 80-inch table diameter to 32-foot table diameter, with work load capacities from 6 to 160 tons. Larger machines can be built to suit any requirements. These new machines have been built with component members so dimensioned as to allow application of maximum cutting forces consistent with the highest efficiency in cutting speeds and feeds (using carbide tools).

Absence of long feed shafts or feed screws to the vertical rams prevents "jumping" under heavy cuts. Feed is through electrical transmission to receiving motors on the saddles; hori-

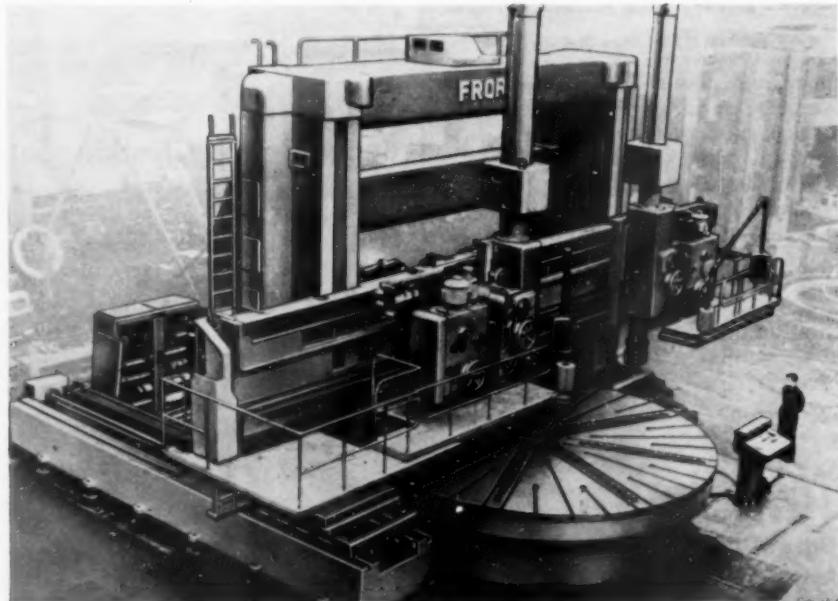
tal feed is through helical pinion to a rack mounted on the crossrail. Thread-cutting is provided through change gears coordinated with the synchronized electrical transmission. Centrally located pendants provide low voltage electric, remote control for all feeds and rapid traverses including regulation of speeds and speed groups.

Main drive is by direct-coupled, variable speed, D-C motor in connection with AC-DC converter. The crossrail is moved and adjusted by a separate motor; clamping and unclamping is automatic when rail is not being moved.

The Froriep Co. is represented in the United States by Cosa Corp., Chrysler Bldg., New York, N. Y.

T-3-1811

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231 TO REQUEST ADDITIONAL TOOLS
OF TODAY INFORMATION



Threading Machine

A double-spindle Landmaco machine, designed for the production threading of pipe and nipples from $\frac{1}{8}$ to $\frac{3}{4}$ inch in diameter, has been introduced by Landis Machine Co., Waynesboro, Pa.

Main feature of this 6B Landmaco are reamer attachments on tangential chaser threading heads which enable the threading, reaming and chamfering



operations to be performed simultaneously. These dieheads also feature an internal trip mechanism to provide constant thread length regardless of normal differences in the nipple length or in the gripping position.

The machine's five spindle speeds, ranging from 133 to 310 rpm, mean that each of the five pipe diameters within the range of the machine can be threaded at the most efficient speeds. Additional speeds are available for special applications.

The sturdy constructed machine bed is especially designed for operating comfort. Other bed features include a large screened opening over the coolant reservoir for rapid coolant return, ample chip space, large doors for chip removal from either side of the machine and a wide drip ledge around the

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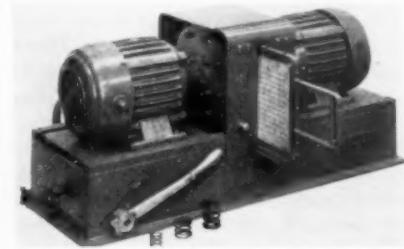
bed to return any coolant overflow.

Carriages are operated by levers and provide a 6-inch travel. The entire carriage vise is adjustable, both horizontally and vertically to assure proper work alignment with the diehead.

Starting and stopping is controlled by a pushbutton station mounted on a pivoted arm that can be moved to either side of the machine for operator convenience. Details on the unit are covered in an illustrated brochure available from the company. **T-3-1821**

Spring Grinder

This small bench mounted double end disk grinder simultaneously grinds both ends of compression springs accurately and economically. Used for both small and large runs, it will turn



out 100 small springs $\frac{3}{8}$ in. O.D. 1-in. long in only two to three minutes.

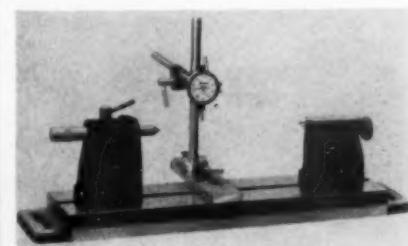
Capacity of the unit is $\frac{1}{8}$ to $1\frac{1}{2}$ -in. O.D. in lengths from $\frac{1}{8}$ to $4\frac{1}{2}$ in. The easy-to-operate unit measures only $13\frac{1}{2}$ in. wide by 17 in. high by 38 in. long.

Wheel dressing is simplified because the grinding wheels can be run in opposite directions and slowly brought together to dress each other.

Complete details about the unit may be obtained from The Carlson Co., 277 Broadway, New York 7, N. Y. **T-3-1822**

Bench Center Checking Set

A complete low-priced Geneva bench center checking set made by Chicago Dial Indicator Co., incorporates several desirable features. A versatile slide has a tip-over upright, and indicator



The Tool Engineer

gements may be utilized for precision checking of all types of materials. The strong upright slide tips backward to permit loading, straightening and adjusting work and maintains original zero setting when returned and locked in place.

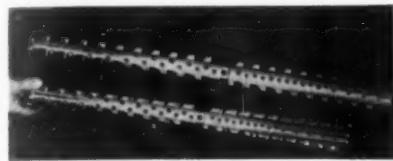
Detailed information, specifications, and prices are available from the manufacturer, Dept. L, 180 N. Wacker Dr., Chicago, Ill.

T-3-1831

Surface Broaches

An inserted-tooth carbide surface broach has been added to the Red Ring line of National Broach & Machine Co., which features a broach bar that has machined integral lugs which back up each of the inserted carbide tipped tools, minimizing tool chatter and avoiding tool breakage.

This design of the integral lug broach bar permits heavy cuts to be taken by individual tools. It can also reduce the



effective length of broach required to finish a semicircular cast iron surface or a portion of a circular surface. The length of broach required to finish a given surface with these broaches depends on the width of the surface, the amount of stock to be removed and the stroke of the broaching machine.

The new broaches can be used on conventional surface broaching machines. Stroke of the particular machine usually dictates the length of the broach in this case.

Details about the surface broach may be had from the company, 5600 St. Jean, Detroit 13, Mich.

T-3-1832

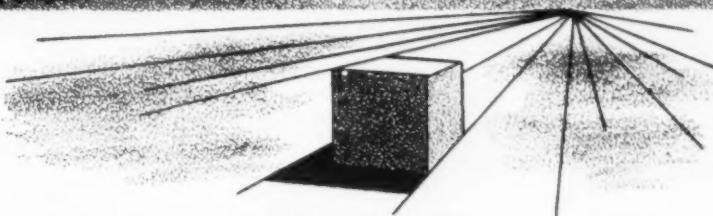
Broaching Machine

Greater precision and faster, more accurate setups in the broaching of boring bars are possible with the horizontal precision broaching machine designed by Sturdy Broaching Service, Detroit, Mich. This custom-built machine will broach boring bars up to eight inches in diameter, of any length, and up to 1 1/4 inch square.

Although it was designed primarily for the broaching of boring bars, its versatility and unusual design make it readily adaptable to many other precision broaching applications.

The machine base is of I-beam construction for strength and rigidity suit-

Through the 4th Dimension Time Barrier to New Production Highs



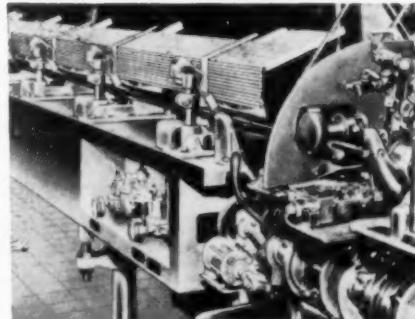
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ALL industrial results are achieved in Time . . . vital 4th dimension that measures output, costs, profit. Shorten the time gap between operations . . . shorten the time when machines are "cutting air" . . . keep machines producing at a steady optimum rate during the fatigue slow-down from 10:30 to noon, and from 3 P.M., till closing time . . . and you are getting 4th Dimension production. Production that is geared to the steady flow of Time.

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Time losses account for the enormous differences in output among workmen. By eliminating these losses automatically, the Lipe AML Bar Feed boosts overall production from 30% to 100%. That's because stock is fed to the machine independent of the operator. Constant pressure behind the stock assures uniform speed of feed. No feed fingers to fail or mar stock. No multiple feed-outs, even on the longest pieces.



Mail the coupon now for free literature giving full details on the Lipe AML Bar Feed.

Lipe Rollway Corporation

Syracuse 4, N.Y.

Sure, I'd like to know more about the Lipe AML Bar Feed. Send me your free booklet.

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Company _____

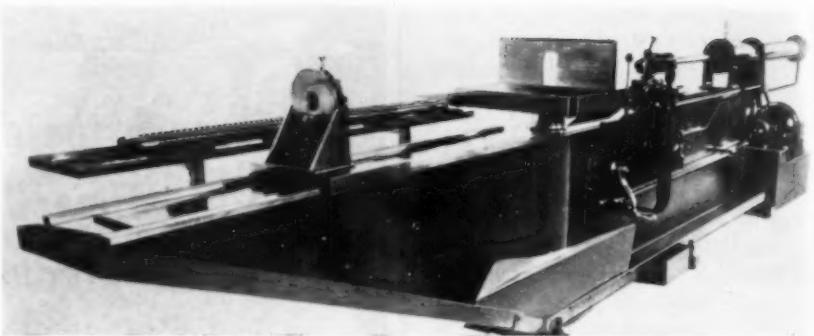
Street _____

P.O. _____ Zone _____ State _____

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able for any precision broaching operation. The follower and pull head of the ram are of the fixed-in-line centers, and are guided or hardened and ground steel ways. The worktable, which is raised or lowered to suit operation in line with fixed center of machine, can also be rotated to any position up to and including 45 deg. All controls and setup adjustments are within reach of the operator standing at the worktable. Speed and power of stroke are contained in one unit.



DIE FEED USERS!

YOU CAN'T AFFORD
TO TURN THE PAGE
WITHOUT READING THIS
MESSAGE.....

There are many serviceable automatic press feeds on the market today. The majority of these are custom built. They're costly, but built to perform perfectly at exceptionally high feeds. The only factor that limits their production is the tooling in the press.

Since the tooling actually determines the feed, you're dollars and days to the good when you select a Dickerman feed from stock because . . .

**DICKERMAN BUILT FEEDS PERFORM PRECISELY
AT VIRTUALLY ANY SPEED
THE TOOLING IS BUILT TO WITHSTAND!**

Now you can have maximum performance and production in a fraction of the time at a fraction of the cost . . .

For eye-opening information on the entire Dickerman line, send today for descriptive literature.

Dickerman



NEW 2½" MODEL K
HITCH FEED®

9" ROL-DI-FEED

6" DIE FEED

4" HITCH FEED

SEE US AT BOOTH 558 ASTE WESTERN INDUSTRIAL EXPOSITION.
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H. E. DICKERMAN MFG. CO.
324-258 Albany Street • Springfield, Mass.

Broaches are guided and held in position to any angle required by the follower which is graduated in degrees for quick, easy adjustment.

Another important feature is a floating puller, which allows succeeding passes to float accurately into position. It also can be locked rigidly when necessary.

T-3-1841

USE READER SERVICE CARD ON PAGE
231 TO REQUEST ADDITIONAL TOOLS
OF TODAY INFORMATION

Magnetic Holding Devices

Large selection of standard magnetic parallels and V-blocks, for holding irregular-shaped pieces on a magnetic chuck, are offered by Hanchett Magna-Lock Corp.

Made of all-steel welded construction with alternate laminations of $\frac{1}{32}$ -inch nonmagnetic steel and $\frac{1}{8}$ -inch low carbon steel which cannot shift, they do not utilize rivets or dowels, plastic or soft filler. Surfaces are precision-ground parallel and square. With standard size Magna-Lock parallels, toolrooms can make their own grinding fixtures.

On the V-blocks, available in 90 and 45 deg from center, the V is ground parallel and centered to the base and ends are ground square.

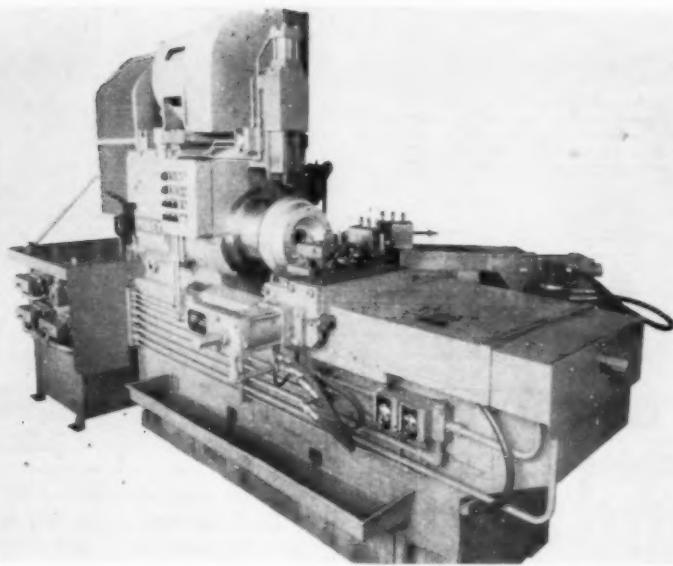
Complete details can be obtained from the company's Dept. P-2550, Big Rapids, Mich.

T-3-1842

Lathe

A special semiautomatic lathe for the machining of aircraft wheels developed by Morey Machinery Co., 383 Lafayette St., New York 3, N. Y., machines the complete landing wheel, with the exception of the hub, in one operation. The machine is hydraulically operated and electrically controlled, with overhead slide and cross slide on which a special tracing slide is mounted.

The wheel is chucked in a special hydraulic chuck; then the tracing slide, which is mounted on cross slide, quick-



Portable Drill Press

An all-angle portable drill press of unusual design and construction, which will drill and tap from most locations with its machine spindle in almost any position, is announced by Sun Tool & Machine Co., 4794 Bennett Rd., Toledo 12, Ohio.

The tool, which combines advantages of a conventional fixed radius drill with portability, offers extra economy in that it reduces expensive work setups to a minimum.

The new Sun portable will drill as close as $14\frac{1}{2}$ inches to, and as far as 38 inches away, from its column; the head rotates on a graduated swivel a full 360 degrees from vertical and the drill head rotates 360 degrees on the column. It has four speeds, 185, 280, 400 and 600 rpm with a four second

ly advances to the turning position and contours the outside diameter and flange of the landing wheel. As soon as the contouring is finished, the overhead slide and two other tools, mounted on the cross slide, machine both surfaces of the landing wheel and knurl the flange simultaneously. Floor-to-floor time for a 14-inch landing wheel is less than one minute. Wheels up to 18 inches in diameter can be accommodated.

T-3-1851

Trucks with Extendable Forks

Increased operating efficiency in aisles as narrow as six feet is possible with the RSAT-3 Warehouser developed by The Yale & Towne Mfg. Co., 11000 Roosevelt Blvd., Philadelphia 15, Pa. The truck is equipped with extendable forks which reach beyond the outrigger wheels to pick up and deposit loads.

Hydraulically operated, the forks slide forward 20 inches to provide 30 inches of effective length beyond the outrigger wheels. As load is handled beyond the wheels, only enough under-clearance is needed to permit fork entry. After the load is on the forks, they are retracted to bring the load back against the fork carriage for transportation. The forks automatically tilt when the load is raised to carrying height for stability, during transit.

Rated capacity of the truck is 2500 lb at 15 in load center; it has an 83-in. overall height and 126-in. maximum fork lift. Its short length, light weight and good forward vision are advantages.

Controls are so located that it is a simultaneous one-hand operation to hoist, lower and drive leaving the operators other hand completely free for steering.

T-3-1852

CUT TOOLING COSTS . . . SPEED PRODUCTION
with fast, accurate, efficient

MAX-WELL MADE Boring and Recessing TOOLS



JF RECESSING TOOLS
For use with jig or fixture on automatic or manual feed machines. Precision grooving, necking, undercutting, inaccessible spot facing. Five sizes to pilot into $1''$ to $2\frac{1}{4}''$ drill bushings. Accurate to within ± 0.001 -inch. Interchangeable shanks.



DB RECESS-O-MATIC
Designed especially for use on multiple spindle automatics for all precision internal forming operations. Three sizes. Maximum capacities $2''$, $3''$ and $4''$. Recessing stroke range from $\frac{1}{4}''$ to $\frac{1}{2}''$.

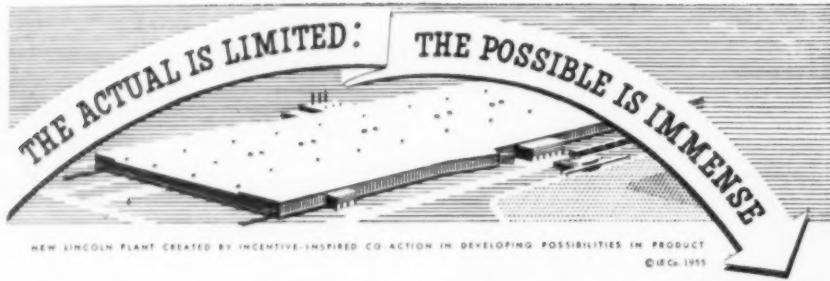


R RECESSING TOOLS
Precision built for sustained recessing, grooving and backfacing operations. Quickly adaptable to any manual feed machine. Four sizes for $\frac{3}{8}''$ to $4''$ holes.

THE MAXWELL COMPANY

251 BROADWAY • BEDFORD, OHIO

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NOW! ONE MACHINE LINCOLN IDEALARC GIVES YOU BOTH AC and DC WELDING CURRENT

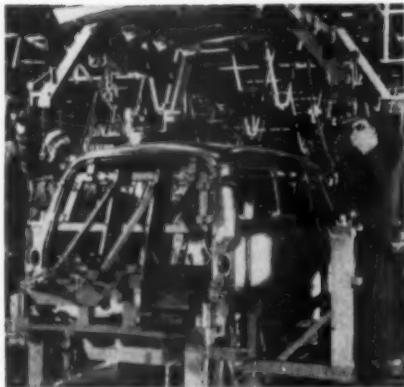


Fig. 1. For light work. Stable arc for AC and DC welding, handles electrodes as small as $\frac{1}{16}$ " for dependable quality production at low cost.



Fig. 2. For heavy work. Idealarc has both soft, steady arc and forceful arc . . . the ideal arc for every type of job . . . production or maintenance.

NOW rectifier welder with both current and voltage controls

NOW rectifier welder with arc-booster starting

NOW DC welder for operation on single phase power

GET FACTS NOW

Send for Lincoln Bulletin 1343. Write:



THE LINCOLN ELECTRIC COMPANY

Dept. 5001 • Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

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average speed change.

Drill capacity is $1\frac{1}{4}$ inches and tapping capacity is $\frac{5}{8}$ inch USS in cast iron, and spindle drilling depth is 5 inches.

Maximum distance from the spindle to the base is 59 inches, but it may be ordered in column height to suit customer requirements. Over-all height of the drill press is 86 inches and the over-all dimensions of the base are 6 x 28 x 43 inches.

It is designed so that a 50-pound pull will easily move it from a standstill on a concrete floor. **T-2-1861**

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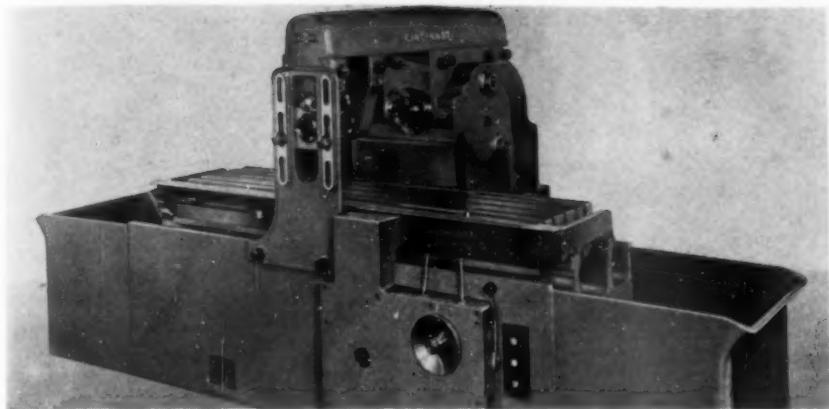
Heavy-Duty Milling Machines

A line of heavy-duty bed type milling machines, called HyPowermatics, have been developed by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. Equipment on the units includes automatic two-way table feed cycles and infinitely variable feed rates. They are designed for continuous operation on medium to larger size parts. Heavier and more powerful than previous models, HyPowermatics offer increased cutting capacity (up to 50 hp) and higher spindle speeds (up to 2000 rpm) for taking conventional milling or climb milling cuts with either high-speed steel or sintered carbide milling cutters.

Standard machines, designated the 300, 400 and 500 series, are built in plain and duplex styles in 42 sizes of each, ranging from 36-inch table travel, $7\frac{1}{2}$ hp, 168-inch table travel, up to 50 hp.

Beds are unusually long, and ways are square gibbed for accuracy and rigidity.

Other features of the machines are



Metal-Treating Unit

A compact 25-lb/hr controlled atmosphere heat-treating unit, designed for laboratory and research work, is announced by Ipsen Industries, Inc., Rockford, Ill. This model RT-25-E, built for temperatures up to 2000 F, is equipped with a 8 x 14 x 8-inch hearth, electric radiant-type heating tubes, and a sealed quench or cooling chamber to provide similar results to those achieved with larger units.

Capable of hardening, carburizing, carbonitriding, and brazing operation, the new unit provides a means for test-

automatic, intermittent table cycles, a feed rate selector dial that provides infinitely variable feed rates ranging from $\frac{1}{4}$ to 100 or 150 rpm depending upon machine size. The table is driven by a new type of unit named Hydromech, incorporating a hydraulic motor with an infinitely variable arrangement.

Operating controls are conveniently and compactly grouped at the operator's normal working position. Spindle rotation can be started and stopped quickly. Also included in the control group is the four-position directional control lever to provide engagement of the table feed and rapid traverse, table stop and automatic spindle stop levers.

Sixteen spindle speeds can be obtained and a choice of nine ranges of spindle speeds are available. The highest group ranges from 50 to 2000 rpm, and the lowest ranges from 20 to 800 rpm.

Another interesting feature are the chip wipers attached to the underneath side of the table to push accumulated chips from the troughs adjacent to the table to the large chip compartments at each end of the bed. **T-3-1871**

Polishing Units

F. W. Derbyshire, Inc., Waltham, Mass., has announced development of the Magnus polishing units, designed specially for small burring and polishing. These bench-type units require only 8 x 12 inches of space.

These units, consisting of a base on which is mounted a $\frac{1}{12}$ -hp motor, motor cone pulley, belt, pad and ball-bearing headstock, provide spindle speeds up to 18,000 rpm.

Two models are offered: polishing unit #2190 employs a ball-bearing spring bind headstock with brake belt for instantaneous starting and stopping of the spindle; and #2191 is similar to #2190 except that it is equipped with a ball-bearing headstock having draw-in spindle and is not equipped with brake belt. Both units take standard Magnus-Elect collets. **T-3-1872**

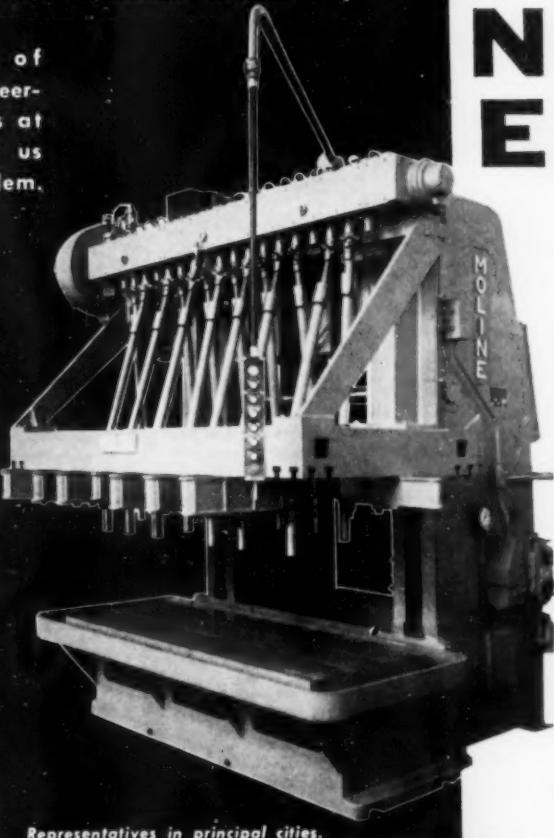
FOR GREATER . . . PRODUCTION • EFFICIENCY • SAVINGS

Use an individually designed "Hole-Hog" Machine Tool for such jobs as:

- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

Over 50 years of
Machine Tool Engineering
experience is at
your service. Tell us
your particular problem.

HU68 drilling machine
with fourteen spindles
adjustable in a 72 inch
by 24 inch drilling
area. Other sizes
available.



Representatives in principal cities.

MOLINE TOOL COMPANY
100 20TH STREET MOLINE, ILLINOIS

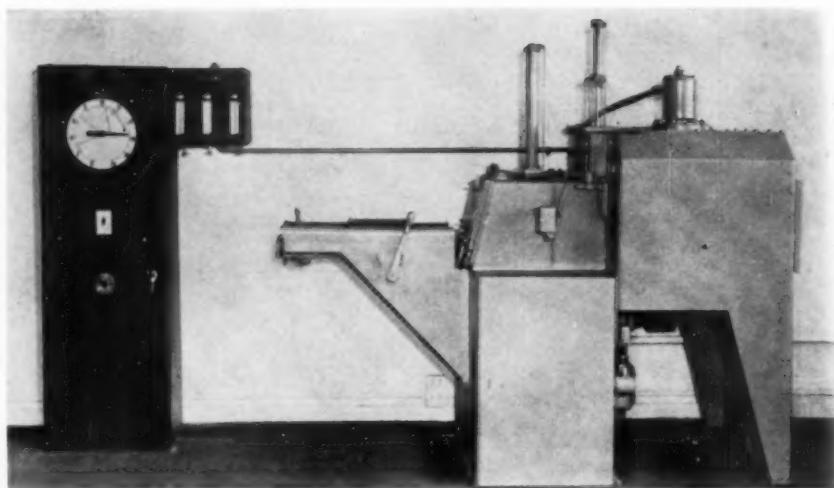
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MOLINE

ing a wide variety of heat-treating processes. A protective atmosphere is maintained in both the heat and quench chambers of the unit, resulting in bright, scale-free work.

The quench tank and cooling chamber are direct-connected to the forward or loading end of the hearth. The two chambers are separated by an intermediate airdraulic-operated door. In the quench tank, any combination of drastic, moderate, or slow quench can be applied as desired. Oil circulation is downward through the load which eliminates displacing small parts from work baskets.

A protective flame curtain is provided at the single loading and unloading door at the front of the furnace.

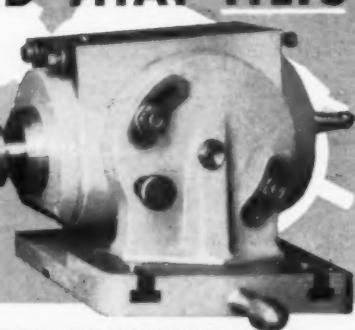


HERE'S A HEAD THAT TILTS

*and Yours Will Nod, Too
When You See What
You Can Do With This
One*

POPE SUPER PRECISION 1 HP,
3600 RPM MOTORIZED TOOL AND CUTTER GRINDER
CLEARANCE ANGLE SWIVELLING HEAD

With Angular Adjustment In A Vertical Plane

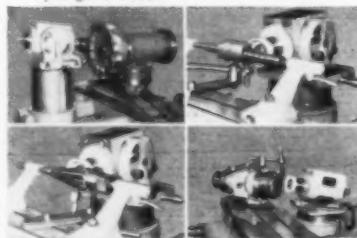


Give this versatile head the nod and save time and money these seven ways:

1. You can use cup wheels for practically all clearance angles and thus produce a cutting edge on tools that lasts longer because it is stronger.
2. You can keep the tooth rest on the center line of the cutter for practically all grinding on centers or in the work head.
3. You can grind most cutters and reamers all over with a single set-up using the swivelling table and Pope tilting head.
4. You can read all clearance angles directly in degrees from the scale provided on the head. No more mistakes.
5. You can get the right clearance angle on such tough grinding jobs as slab mills, taper reamers, angular cutters and form tools.

6. You have one safe speed — 3600 RPM — for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.

7. You have a head that's so easy to adjust and use it saves you time and money every time you grind a tool.



Ask us to submit complete specifications including price and delivery.

No. 101

Specify **POPE**
PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS

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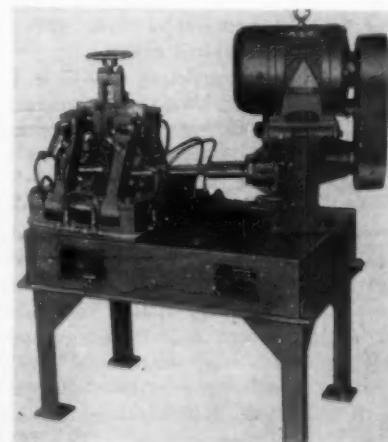
Over-all dimensions of the unit are 32 inches wide, 96 inches long and 82 inches high. Its hearth is 8 x 14 x 8 inches. Quench tank holds 40 gallons. Maximum operating temperature is 2000 F, while work capacity is 25 lb/hr.

T-3-1881

Rod and Tube Straightener

Sutton Engineering Co., Bellefonte, Pa. is manufacturing a small table-mounted straightener, known as the Sutton Model OOKTC, designed specifically for precision straightening of rods and tubes of small diameter and short length.

The unit employs an exclusive 7-roll straightening principle in the pass line. A three-roll cluster, consisting of a large driven roll with two opposed idler rolls, is located at the entry end of the machine and an identical cluster is at the delivery end. In the clusters, rolls are positioned at approximately 120 deg to each other. Between the clusters, at the center of the pass line, is an unopposed pressure roll. This roll arrangement provides ease of feeding, positive retention of tubing to pass



line and accurate end-to-end straightness at continuous production speeds without use of guides of any kind.

Setup time is fast and easy with only three adjustments required. When necessary, all of the rolls can be changed in less than 15 minutes, because of a special clamping mechanism. The complete screw-down assembly can be disconnected from the pivot arms without disturbing the setting.

Designed for continuous production on a 24 hour day assembly line basis, all roll bearings are automatically lubricated by an integral oil mist system. With an automatic hopper feeding device, the machine will run continuously with minimum operator attention. Total weight, including the table is 1500 lb and little floor space is required.

T-3-1891

Dividing Machine

The George Scherr Co. is offering an automatic circular dividing machine, made by George Kesel K. G. of Germany, for the dividing of dials, circular scales, etc. The Kesel dividing machine is started by a duplex pushbutton and is stopped automatically by a revo-



lution counter which is preset for the number of lines to be cut. The new model, which combines fine precision and sensitivity, also offers speed and will cut up to 100 lines per minute.

Of sturdy construction, and with a capacity of approximately 40 inches, the machine will accept heavy loads without affecting its accuracy or its ability for dividing small work such as graduated collars, etc.

For linear divisions, an extra attachment, hand operated, is available and can be used for longitudinal divisions to over 12 inches.

Literature may be obtained from George Scherr Co., Inc., 200 Lafayette St., New York 12, N. Y. T-3-1892

Automatic Lubrication

A large, 4½-gallon oil capacity bearing lubrication unit of the oil-fog type has been announced by the C. A. Nor-gren Co., 3450 S. Elati St., Englewood, Colo.

Twin lubricator heads may be used simultaneously or individually depending on fog requirements for the specific application. The fine Micro-Fog generated can be carried great distances with minimum precipitation in the lines and can be uniformly distributed to multiple bearing lubrica-



Walker Does It Again-



Industry required a 48-inch diameter Rotary Permanent Magnetic Chuck. O. S. Walker Company, Inc., Worcester, Mass. responded by designing and building this permanent chuck, the world's largest—and larger sizes are now available. Whatever your holding problems—magnetic or vacuum—Walker engineers have the answer. They are as close to you as your telephone—Worcester, Mass. PLeasant 6-6293.

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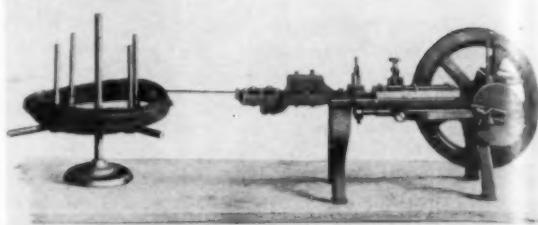
tion points having a maximum total of 1000 bearing inches. A compact unit, it measures 27 x 12½ x 16½ inches. Three 2-inch fog outlets provide for flexibility of installation.

Several unusual automatic control features are provided by the design of this Model 33AB-4. Warning signals or other safeguards inform the operator of depletion of oil supply, failure of air supply, and excessive pressure in oil supply tank. Micro-Fog delivery automatically starts and stops in coordination with the machine operation.

T-3-1901

Straightener for Small Diameter Wire

Lengths of wire from one to 12 inches long and up to ½ inch in diameter are straightened and cut to size accurately and quickly by the Lewis No. 7 wire machine, manufactured by The Lewis Machine Co. The unit can be either hand operated or belt or motor driven. Graduated scale simplifies adjustment to produce any desired



length of wire. Wire on a reel adjustable to any size coil is fed through machine by reciprocating feed clutch and automatically straightened and cut to length. A ten-roll straightener does the work. The machine is simple to set up, easy to operate and affords versatility in all industrial operations. Practicality and durability have been proven in extensive use by foundries in the preparation of core wire and in many other industries. Other models of Lewis wire straightening and cutting machines, with stationary cutoff or with flying shear, and with selection of feed speeds, are available for straightening and/or cutting material up to ¾ inch in diameter. Additional information is available from the company, Dept. 1H, 3441 East 76th St., Cleveland 27, Ohio.

T-3-1902

you may not feel it, but

VIBRATION

**can wreck
your tools**

Your hand may never sense it...but your balance sheet feels the effect of tool vibration. For vibration destroys tool edges...and increases costs...until your profits may literally vanish.



First step in curing these tool-killing vibrations is locating and measuring them. CEC's 1-117 Vibration Meters and vibration pickups, will do this for you...accurately, quickly, inexpensively. Where usual trial-and-error corrective measures...changing speed, cutting angle, coolant and clearances...don't cure tool breakage, try CEC's electronic vibration-measuring instruments. By pin-pointing vibration's cause, they can help make higher speeds and feeds practical, improve work finish, and increase cutter life by as much as 75%.

Send for "MACHINE TOOLS AND VIBRATION," Bulletin CEC 1555-X1.

TYPICAL CASE HISTORY... Abnormally short tool life on 4130 steel. A CEC vibration meter and pickup located a 700-cycle-per-second vibration with an amplitude of only .0003", undetectable to the touch. Cause was tracked down to improper tool seating. Regrinding the post and lapping the seat eliminated the vibration...and more than doubled useful tool life.



Pickups are available for measurement of either linear or torsional vibration.

Consolidated Engineering Corporation

ELECTRONIC INSTRUMENTS FOR MEASUREMENT AND CONTROL

300 North Sierra Madre Villa, Pasadena 15, California

Sales and Service Offices Located in: Albuquerque, Atlanta, Buffalo, Chicago, Dallas, Detroit, New York, Pasadena, Philadelphia, Seattle, Washington, D. C.

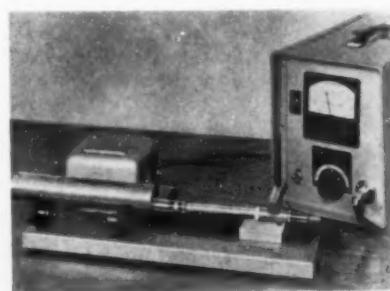
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USE READER SERVICE CARD ON PAGE 231 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Roughness Measuring Tool

Micrometrical Mfg. Co. announces the Type RF Cylinder Pilotor, for taking Profilometer roughness measurements around the circumference of tubing, round bar stock, and other cylindrical pieces.

The piece to be measured is placed on two pairs of rollers, as illustrated. One belt-driven roller rotates the work at a surface speed of 0.3 ips. The roughness measurement is made by a Type LA Tracer which remains stationary while the work rotates beneath it. Design of the unit permits the tracer to be adjusted in height for different work diameters, and in length



The Tool Engineer

for measuring at different locations along the work.

The equipment illustrated provides for measuring around ID's as small as $\frac{1}{8}$ inch and around OD's from $\frac{3}{4}$ to 3 inches, and provides a $7\frac{1}{4}$ -inch lengthwise adjustment of the tracer position. Minimum length of work accommodated is $2\frac{1}{2}$ inches, and maximum recommended length is 12 inches. Other Profilometer Pilots of similar design can be furnished for larger or smaller OD's, for work shorter than $2\frac{1}{2}$ inches and for work as long as 4 feet or more.

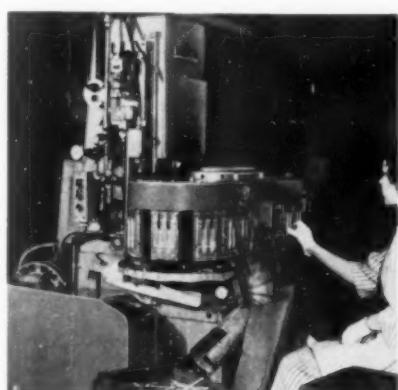
Full details are given in Bulletin LT117, available from the maker, 345 S. Main St., Ann Arbor, Mich.

T-3-1911

Belt Grinder for Close Tolerance Work

Engelberg Huller Co., Syracuse, N.Y., is manufacturing an abrasive belt grinder called the BG-8 Automat, that flat-grinds and polishes small metal parts rapidly and accurately. It is equipped with a self-powered, continuous work feed and an 8 x 107-inch abrasive belt.

Workpieces for the unit are manually loaded but automatically ejected. Eject-



tors consist of either a positive stop to slide a part off its supporting ledge or a spring claw entering a groove in a pad behind the work. For normal parts, the supporting ledge is shaped as a shallow V-block, with work supported close to the belt.

The feed unit has 21 fixture plates, each $3\frac{3}{4} \times 6\frac{1}{4}$ inches. Number of parts that can be loaded on each fixture plate is limited only by their size.

Feed speeds are variable; fixture plate rates of travel can be set at 1090, 1350 or 1750 per hour. Depending upon the number of workpieces on each plate, production rates up to 14,000 or more pieces per hour are possible.

The BG-8 Automat is 72 in. high, 48 in. wide and 48 in. deep. T-3-1912

Roll Lifters for Feeds

Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif., has announced the addition of roll lifters as standard equipment on all roll feeds. With this new addition, rolls are separated slightly after each feed stroke is completed, thus releasing tension on stock between press and coil supply. The lifters are considered particularly useful when feeding to piloted dies on various progressive operations and other jobs where accuracy is vital.

Benchmaster automatic friction roll feeds are available in 3, 5, 7 and 9-inch roll widths, in 0 to 3-inch cutoff and 0 to 6-inch cutoff stroke lengths. Rolls are plain, knurled or rubber covered according to demand. T-3-1913

Automatic Loader

Hautau Engineering Co., 721 Wanda, Ferndale 20, Mich., has added an automatic loader and unloader to its line of equipment designed to automate standard production machines.

Particularly adaptable to use with horizontal spindle machines, the unit is compact, and may be used where space limitations have made the possibility of automatic loading seem improbable.

The loader feeds a part to the machine from an incoming conveyor or a preceding machine and simultaneously removes a finished part from the machine to an outgoing conveyor.

The clutch and brake for the unit are controlled by limit switches which

YOU GET SPEED PLUS ACCURACY WITH

MOORE JIG BORERS

IN THE TOOLROOM

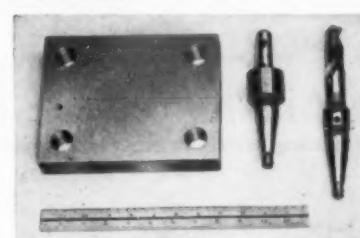
400 holes to "tenths"—5 to 7 minutes each on the No. 1 Moore Jig Borer



Manufacture of this group of drill jigs involves accurately locating, drilling and boring approximately 400 holes. The No. 1 Moore Jig Borer finished them to "tenths" in from five to seven minutes per hole.

ON PRODUCTION

64 holes to $\pm .0002"$ —2 minutes each on the No. 2 Moore Jig Borer



Sixteen pieces like this were located, drilled, bored and checked on a No. 2 Moore Jig Borer with one drill and one carbide bit. The 64 holes were finished in 2 hours and 8 minutes (plus 30 minutes setup) with location and size tolerances $\pm .0002"$.

Only a precision machine geared to the high American production standards of ruggedness and accuracy can meet these performance requirements. For versatility and speed in spotting, drilling, reaming, boring and checking operations in production as well as tooling, no other moderately-priced machine tool compares with the Moore Jig Borer. And there's no sacrifice of accuracy for speed, since the lead screw measuring system built into each Moore machine permits working to the closest of tolerances.

You'll find that the Moore Jig Borer can pay for itself—in jig time. Write today for detailed bulletins.

Moore Special Tool Company, Inc.
732 Union Avenue, Bridgeport 7, Conn.

NO. 1 MOORE JIG BORER
Table working surface of $10\frac{1}{2} \times 16\frac{1}{2}$. Over 1200 now in use throughout the world. The ideal small, accurate jig borer. Lead screws accurate to $.0002"$ in $16\frac{1}{2}$.



NO. 2 MOORE JIG BORER
Table working surface of $10\frac{1}{2} \times 19\frac{1}{2}$. Heavier cuts, larger holes. Features infinitely variable spindle speeds, three power feed ratios, centralized control panel.



ADD MOORE TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-191

NEW 6" BELT GRINDER only \$165.00!



THIS LOW-COST Engelberg/Porter-Cable Abrasive Belt Grinder supplements other machines in your shop to step up production and improve results. Use it as a clean-up machine alongside the miller, shaper, automatics, hacksaw or shear. It will remove burrs, cutter or tool marks with speed and smoothness. Use it for polishing, taking off stock, breaking sharp corners. Use it in the gear-cutting department where it will whisk off a burr in an instant. Use it to touch up tools for the set-up men. Use it in the assembly department for fitting parts. Use it in the tool room for grinding flats, making and repairing jigs, sharpening tools.

Practically every department in your plant will find scores of uses for this latest addition to the Engelberg/Porter-Cable line of Abrasive Belt Grinders. Get complete information—mail coupon today.

THE **ENGELBERG** HULLER CO., INC.

The **ENGELBERG** Huller Co., Inc.
303 Seneca St., Syracuse, N. Y.

Send complete information on new Model 648 6" Belt Grinder and name of nearest distributor.

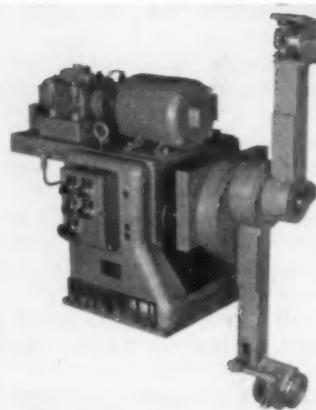
Name _____

Firm _____

Address _____

City _____ Zone _____ State _____

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-192



allow the loader to be connected in timed sequences with the other production equipment. The loader is equipped with its own control panel which may be located remotely.

The loader may be mounted either on its own heavy cast base or directly on the machine or conveyor. The lubrication system and seals are designed so that the loader may be mounted in any position. The loader box requires a space of 16 x 16 x 32 inches. **T-3-1921**

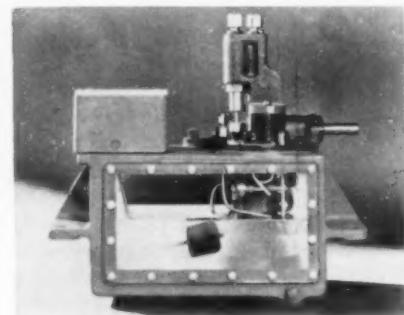


Model 648 Belt Grinder can be changed to horizontal position in just 5 seconds.

Lubricator

A line of triple-service lubricators, developed by Bijur Lubricating Corp., Rochelle Park, N. J., is adaptable for use on machines whose construction requires several different oiling techniques simultaneously.

Originally designed for bottling machines, they have been utilized on sev-



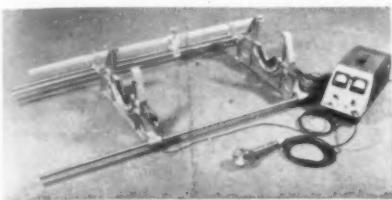
eral types of equipment with various manual, pneumatic or automatic operating modifications. The lubricator shown equipped with pneumatic controls, provides continuous, cyclic and jetting lubricating services on a machine for The Crown Cork & Seal Co.

In addition, the lubricator incorporates a float switch which warns when the oil level is low in the reservoir and shuts down the machine when the oil reaches the minimum safe level. The machine cannot be restarted until the oil supply is replenished. **T-3-1922**

Balance Stand

A dynamic balance stand has been developed by the International Research & Development Corp., Columbus, Ohio to further the efficiency of its vibration analyzers in balancing individual rotating parts. The vibration analyzer itself is instantly detachable from the new accessory for use wherever needed, and as quickly reconnected.

The stand balances armatures, gears, flywheels, sheaves, etc., to vibration tolerances as fine as 0.00025 inch. It



features mechanical plane separation to avoid cross effect of imbalance from one end of a rotor to another. The suspended saddle assembly is locked at each correction plane during the balancing operation, and after phase of imbalance is established, only one run at each end of a rotor is usually required. It has a capacity of from 30 to 500 lb, and parts up to 24 inches diameter and 4 feet 3 inches in length can be accommodated without modification.

T-3-1931

USE READER SERVICE CARD ON PAGE 231 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Hose Couplings

A line of quick-connect and disconnect hose couplings featuring one-hand operation without turning or twisting to lock has been patented by the Breco Div., Perfecting Service Co., 332 Atando Ave., Charlotte 6, N. C. These couplings, called Pushomatic, automatically lock to make a high-pressure leakproof connection. An integral check valve automatically shuts off line



or hose pressure when disconnected and prevents danger of backlash or whipping. Other advantages offered by the design include greater flow, full 360-deg swivel action and unusually small diameter. A variety of styles and types of couplings and connecting plugs are available in sizes $\frac{1}{8}$ through $\frac{3}{4}$ inch for application up to 10,000 psi. The 1A series was designed specifically for instrumentation, manifold and panel installation where space is limited; the 2A series was designed for pneumatic tools, air, water and hydraulic supply lines.

T-3-1932

Bench Model Backstand

Hammond Machinery Builders, Inc., 1600 Douglas Ave., Kalamazoo, Mich., has announced the addition of a new bench model to its line of abrasive belt backstands.

This most recent addition, the Model 524, will quickly convert a present grinder or polisher into a fast-cutting, time-saving abrasive belt machine.

Designed for production work on light polishing or deburring operations, the unit uses belts up to 4 inches wide. Mounting bracket for floor or wall

Standard interchangeable counterbores in economy, quick-change and heavy-duty types for all counterboring, spotfacing and countersinking. Also back-spotfacers, core drills, carbide-tipped counterbores.



Standard block-type boring tools for production rough boring, semi-finishing and reaming consist of standard blocks with adjustable, highspeed steel or carbide-tipped blades, rigid in slotted bars, yet quickly changed.

TOOLING - Standard and Special

Gairing E-Con-O-Mill standard milling cutters save on inventory and grinding. Finish-ground blades fit cutter bodies of all sizes. Series 2500 cutters 5"-16" dia. and blades carried in stock.



Chip-Hog heavy duty turning tools allow top feeds & speeds on any machine. Pre-formed carbides, held rigid, adjustable two ways, save on grinding. Heat treated alloy steel shanks, in 3 styles, outlast many brazed tools.

by GAIRING TOOL - Detroit

Conner-type spade drills, now made by Gairing Tool, drill large and deep holes from the solid, in one operation. 256 cutter sizes, 1 $\frac{1}{4}$ " to 5" diameter, are interchangeable in 8 sizes of holders.



This tool, performing boring, hollow milling, facing and chamfering, is an example of the wide variety of the special tooling which is a major part of our business. May we solve your tooling problems?

When buying standard end-cutting tools, it's good economy to standardize on Gairing. For special tooling also, look to Gairing to design and make the tools that cut the costs • Write for our catalog and for the name of the nearest Gairing representative.

**ALLIED TOOL & ABRASIVE SUPPLY CO., LOS ANGELES 58,
distributors in southern California, stock Gairing standard tools
See them at Booth 161 at the A.S.T.E. Western Tool Show**

Other Western Representatives: Edwin L. Fry, San Francisco
Geoffroy-Lane, Inc., Denver • Hall Tool Co., Portland • John H. Marvin Co., Seattle

The GAIRING TOOL COMPANY • 21223 Hoover Road • Detroit 32, Michigan
In Canada: A. C. Wickman (Canada) Ltd., Queensway, Toronto 14

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-193

THE OPTICAL JIG BORER

ABA . . . Type VL 600

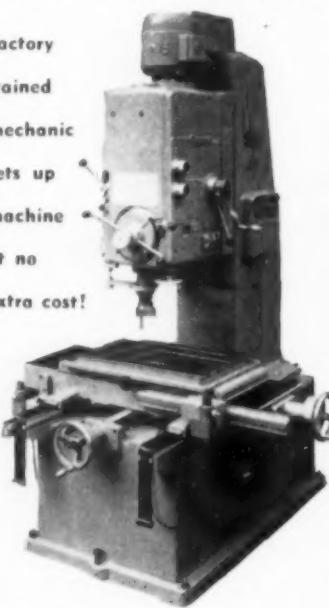
Capacity that you need . . . at a price you can afford!

For Heavy Duty Work and finest Boring and Facing Operations

- Direct Reading of 5/100,000"
- No Gauge Blocks or Measuring Rods needed.
- No dependency on accuracy of Lead-screws.

Built in Western Germany . . . Based on 25 years of experience in manufacturing Jig Borers and precision measuring tables.

Factory
trained
mechanic
sets up
machine
at no
extra cost!



Working Surface	16" x 26"
Table Traverse	17" x 26"
Table to Spindle, maximum	21"
Quill Travel	8 1/8"
Weight, Approx.	5600 lbs.

If yours is one of the plants where you must use costly jig borers for layout and measuring work, or if you have to spend a lot of time and money making measuring gauges, you will be glad to learn that ABA also makes an optical layout and measuring table of various sizes to suit your particular need. Please request literature.

NOTE THIS! No other industrial product in the world enjoys more universal acceptance based on quality and performance than the PARKER pen. THE PARKER PEN COMPANY of Janesville, Wis. depends for high precision jibgoring work on the ABA JIGBORER VL 600. It will never fail them!

Write us for Proposal, now!

COLUMBIA INTERNATIONAL CORPORATION

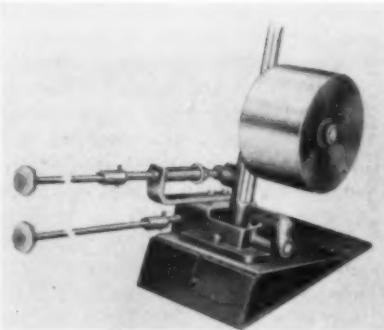
Importers of fine machine tools

10-35 44th Drive, Long Island City 1, N.Y.

Telephone: Stillwell 4-1546

VISIT US AT BOOTH #100, A.S.T.E. SHOW IN LOS ANGELES, MARCH 14 TO 18

INDICATE A-3-194-1

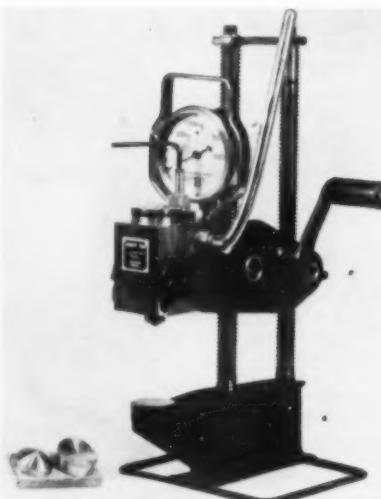


mounting is available to facilitate easy installation. Extension controls for tracking and tensioning can be furnished so adjustments can be made at the operator's working position.

Besides low cost, the Model 524 offers speed, versatility and ease of use. Literature on the unit is available from the manufacturer. **T-3-1941**

Portable Tester

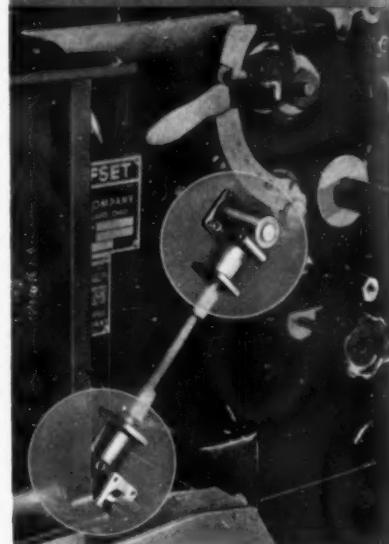
A portable, lightweight, hardness tester that makes accurate Brinell tests on nonferrous alloys is announced by Andrew King, 67 E. Lancaster Ave., Ardmore, Pa. Special feature of the tool is its removable test head that makes it possible to test parts of any size or shape. A precision instrument, it can be used in any position, even



upside down, with or without the base. The King portable can be set to pop off at 62 1/2 kg, 125 kg, 250 kg, 750 kg and 1000 kg, the maximum load that can be applied. For applications and where a small impression is desirable, 5-mm and 10-mm balls are used. A narrow and shallow nose at the anvil permits the tester to be used in small, cramped spaces, tubes or cylinders. It has a throat 4 inches deep; gap 10 inches high with either the 10-mm or 5-mm ball.

T-3-1942

Make
ANGLgear
your
strong
link



Photograph courtesy Oxy-Dry Corporation

No need to rely on chains and sprockets for right-angle transmission. Substitute an ANGLgear for a neater, more dependable job. The small size and heavy-duty design of this standardized bevel gear drive have won it a place in industry. ANGLgears are rated up to 2 1/2 hp at 1800 rpm. All models are made with 1-1 gear ratio, and with 2 or 3-way shaft extensions. Contact your local distributor, or write us for details.

AIRBORNE

ACCESSORIES CORPORATION

HILLSIDE 5, N.J.

INDICATE A-3-194-2

The Tool Engineer

Drill Comparator

Correct angle and centrality of drill points are easily checked for accuracy with the Matrix optical twist drill comparator being distributed in this country by Engis Equipment Co., 431 S.



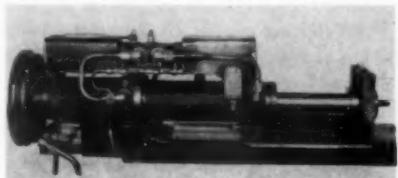
Dearborn St., Chicago 5, Ill. Utilizing optics, a small projector of 5X magnification has interchangeable screen to suit individual or standard needs. It can be placed at the drill grinder to assure correct angle and centrality of drills $\frac{1}{16}$ to $\frac{1}{4}$ inch in diameter. The instrument is equipped with quick-acting locator and focusing knob.

T-3-1951

Hydraulic Unit

Pin-point accuracy in operations where uniform automatic feeding is required, broad versatility and adaptability, and rapid, simple change-over from job to job are the advantages offered in the hydraulic unit developed by Rock River Engineering Co., Empire Bldg., Rockford, Ill.

Known as Model E, this $1\frac{1}{2}$ hp unit is designed so that the ram is coaxial



with the spindle, exerting its full force directly behind the head.

Guide bars and other auxiliary equipment are not required in adapting the Model E to a particular application.

The unit is available with a ram stroke of 6, 9, or 12 inches; feed rate is 0 to 8 inches per minute, with a traverse speed of 240 inches per minute. Since pump and spindle are driven independently, pump speed can be set for any traverse speed required to synchronize with other units. Spindle speed can be set for 600 to 3600 rpm.

T-3-1952

End Mills

Wadell Tools has introduced an unusually designed end mill that will cut freely and accurately in ferrous and nonferrous metals with exceptional strength and durability.

The end mills are produced by an automatic machining process which produces tools to very accurate physical dimensions, permitting uniform flutes in each end mill and consistent uniformity in all end mills. The automatic machining process cuts each flute in only one direction with low microinch finish.

Field tests on the tools indicate that feeds can be increased from three to seven times with an increased tool life from four to ten times.

For details, write to the company P.O. Box 97, Raritan, N. J. T-3-1953

Centers with Replaceable Tips

Economy with improved production time are advantages offered by the center called Grip-Tip, introduced by Detroit Reamer and Tool Co., 2830 E. Seven Mile Rd., Detroit 34, Mich. These centers consist of a holder made of tool steel and a replaceable carbide tip. Holders are available in several standard Brown & Sharpe, Morse & Jarno shank tapers; solid carbide tips



For automatic production

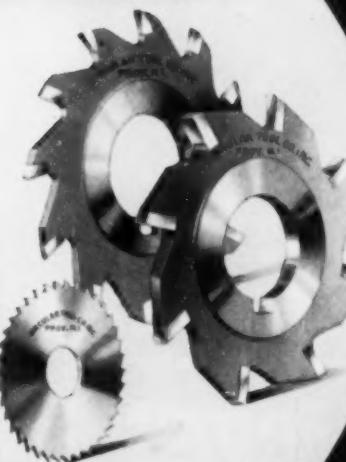
... your best choice is CIRCLE R CARBIDE SAWS

For fast production, especially where extra tough cutting prevails, Circle R Carbide Saws are indicated. In an automatic production layout, where precision performance is indispensable, they are the best you can buy — yet they cost no more. Our expanded and inclusive line—both carbide tipped and solid tungsten carbide—is designed to fully meet your needs.

Get prices and details from
CIRCLE R specialists in—

BURBANK INDIANAPOLIS
CHICAGO KANSAS CITY
CLEVELAND MILWAUKEE
DAYTON NEW YORK CITY
DETROIT PHILADELPHIA
MONTREAL

PHOENIX
PITTSBURGH
PROVIDENCE
ROCHESTER
ST. LOUIS



CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND

Specialists in
Circular Cutting Tools Since 1923

METAL SLITTING SAWS
COPPER SLITTING SAWS
SCREW SLOTTING SAWS
COMMUTATOR SLOTTING SAWS
JEWELERS SLOTTING SAWS
CUT OFF SAWS • CIRCULAR
KNIVES & ROTARY SHEAR
BLADES • CIRCOLOY STEEL
SAWS • SOLID & TIPPED
TUNGSTEN CARBIDE SAWS
COMBINED DRILLS & COUNT
ERSINKS • CENTER REAMERS

You are cordially invited to visit Circular Tool
Booth 604 at the ASTE Exposition in Los Angeles.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-195

are available in $\frac{1}{4}$ and $\frac{1}{2}$ -inch diameters and are accurate to 0.0005 inch. Both can also be furnished to customer specifications.

Designs incorporate an unusual clamping action of holders on tips, being positive and quick as well as simple.

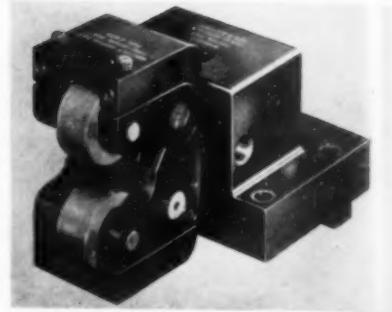
Long life is assured because only dull or chipped carbide tips are reground. Because the steel holder is not ground when sharpening carbide tip, there is less clogging of diamond wheels.

T-3-1961

Thread Roller

A thread rolling attachment that requires a single adjustment for precision matching of rolls and two adjustments to set pitch diameter precisely is manufactured by The Sheffield Corp., Dayton 1, Ohio.

This attachment, called the Precision-Rol, rolls high precision, close tolerance uniform threads, right or left hand, on automatic screw machines or turret lathes at mass production rates. It will produce annular or helical



grooves, taper threads and nonuniform starts as well as knurling and burnishing.

Five standard sizes available, providing these thread diameter capacities and roll face widths: 0 to $\frac{3}{8}$ -inch diam by $\frac{41}{64}$ -inch face width; 0 to $\frac{7}{16}$ inch by $\frac{53}{64}$ inch; $\frac{1}{4}$ to $\frac{7}{8}$ inch by $\frac{53}{64}$ inch; $\frac{3}{8}$ to $\frac{1}{2}$ inch by $\frac{1}{4}$ inch; and $\frac{3}{4}$ to $\frac{11}{16}$ inch by $\frac{1}{2}$ inch. Each size has an unlimited range of work diameters within its capacity. Special sizes and rolls also are available.

For details, write to the company for Bulletin MU-PR454. **T-3-1962**

RING

PUNCHES DIES

NEW CATALOG!
Just off the press!



20 pages illustrating our complete line of perforating products. Detailed dimensions and prices for each size given. Available for the asking.

RING PUNCHES & DIES

Hard . . . Tough . . . Concentric

Precision-made of both Carbon Vanadium and high carbon, high chrome steels.

**EXCLUSIVE DISTRIBUTOR WANTED
FOR STATE OF CALIFORNIA**

RING PUNCH & DIE COMPANY

Gentlemen: Please send me a copy of your new, complete CATALOG #104 at once.

110 FOOTE STREET
JAMESTOWN, N. Y.

TE-12

NAME _____

COMPANY _____

ADDRESS _____

CITY _____

ZONE _____ STATE _____

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USE READER SERVICE CARD ON PAGE
231 TO REQUEST ADDITIONAL TOOLS
OF TODAY INFORMATION

Hole Gage

Accurate readings within 0.0005 inch are possible with the #20 Kwik-Chek direct reading precision hole gage made by the New Standard Div., U. S. Expansion Bolt Co., York, Pa.

The Kwik-Chek which is designed for quick-accurate measurement of hole diameters ranging from 0.025 to 0.130 inch, is graduated in thousandths. With the built-in $2\frac{1}{2}$ power crystal magnifier, direct readings can be made in half-thousandths. Table of decimal equivalents of fractional and wire drill sizes is stamped on gage.

Two additional gages will be introduced later: the #30 with a range from 0.125 to 0.250 inch and the #40 with a range from 0.245 to 0.380 in. **T-3-1963**



Small-Mill Tools

Quick-change tools for small mill operations that offer economy in addition to speed are made by Portage Double Quick Tool Co., 1054 Sweitzer Ave., Akron 11, Ohio. Only $\frac{1}{2}$ inch tool clearance is needed between the end of the tool and the work piece in



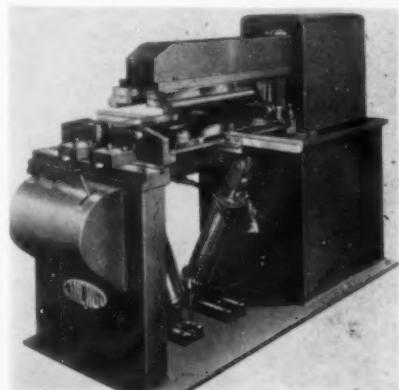
order to change tools, while the company's V.S. (very small) tool series eliminates almost entirely, the lowering or shifting of the table and work when changing from one tool to another.

Tool and adapter holders are available with #30 mm tapered shanks, #2 and #3 Morse taper, #7 and #9 B & S shanks, and R-8 shanks. Special type shank holders also may be obtained.

T-3-1971

Folder Brakes

Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, Ill., announces three models of folder brakes—a single-wing model, a double-wing model with open-throat and fixed head, and a double-wing model with open-throat and moving head. All three units



OUTLINE OF THINGS TO COME-

An advertisement for Thunder Bay Manufacturing Corp. The top half features a large, stylized graphic of a folder brake machine, with the words "RE-DESIGNED" and "FOLDING" visible on its side panels. The text "use 'out-lines'" and "filled by" are also present above the main title. The main title "THUNDER BAY" is written in large, bold, block letters. Below it, the word "PRESS" is partially visible. The bottom half contains several lines of text: "RE-DESIGNED FOR TODAY'S PRODUCTION TEMPO", "We'll be glad to tell you more. Just write, wire or phone:", and "THREE DAY DELIVERY".

THUNDER BAY MANUFACTURING CORP.
Detroit and Alpena, Mich.

Detroit Phone: LOGrain 7-6070

Alpena Phone: 834

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-197

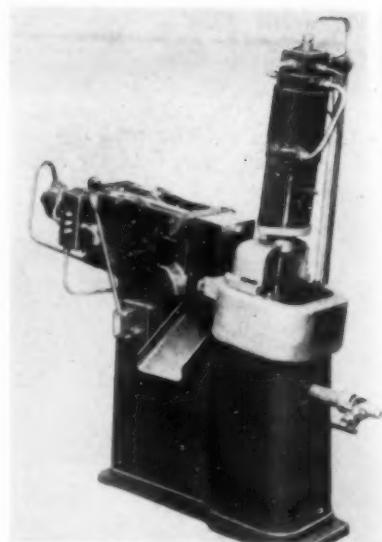
are custom built in that they meet individual requirements for length of bend, distance between bends, sharp or radius bends with or without flanges, offsets, or beads. Any of the folder brakes may be had as a single-purpose machine or may incorporate flexibility to handle a variety of sizes or products. Pneumatic, hydraulic or mechanical operation is available to suit specific conditions.

Among the advantages of the units are their fast accurate production, simple design, economical cost, and fully automatic operating cycle. **T-3-1981**

Die Casting Machine

A redesigned machine pot including integral gooseneck and hardened sleeve and nozzle, with a 50-percent more metal capacity is featured in the Imp-96A 1-lb zinc alloy die casting machine just introduced by DCMT Sales Corp. At the same time, the clamping studs have been increased in diameter, and optional spacing is provided so that die sizes up to 9 x 9 inches may be accommodated.

Other changes include a more mas-



sive die toggle unit to insure a stronger and more positive lock. Average working speeds of this machine have been raised to between seven and nine hundred shots per hour on production runs.

For descriptive literature, write to the company, Dept. TE, 164 Duane St., New York 13, N. Y. **T-3-1982**

ACME dowel pins

133
STANDARD SIZES
precision or oversized

Sizes range from $\frac{3}{8}$ " to 6" in length— $\frac{1}{8}$ " to 1" in diameter. Precision pins are hardened and ground to .0002" or .001" over nominal diameter—oversized from .002" to .005".

Acme Pins are case hardened to 60-62 Rockwell "C" scale and core hardened to 36-38. These pins will break before bending or mushrooming—preventing misalignment or breaking of doweled parts. A special lubricant is used on pins to prevent scoring when being driven in and out of holes.

Order from your distributor—or
write for Acme Dowel Pin folder and
name of distributor nearest you.



ACME INDUSTRIAL COMPANY
208 N. LAFLIN STREET, CHICAGO 7, ILLINOIS
Manufacturers of standard dowel pins • Chamfer micrometer gages • Drill jig
bushings • Portable bench centers • Roughness comparison specimens • Hardened
and ground parts manufactured to order

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-198



Lathes

A line of popular priced 9-inch and 10-inch swing self-contained motor drive floor lathes, introduced by the South Bend Lathe Works, South Bend, Ind., is designed to combine the advantages of floor mounting with the economy of bench lathe construction.

A 12-speed self-contained motor drive unit is permanently mounted back of the lathe headstock. Approximate spindle speeds are 48 to 1435 rpm for the 10-inch lathe and 50 to 1270 rpm for the 9-inch lathe. Direct belt drive to the spindle assures smooth operation at high speeds. Slow spindle speeds are driven through back gears. A quick-acting belt tension release permits releasing the tension of the cone pulley belt to change speeds.

Both lathes are made in quick-change gear and standard change gear models. Quick-change equipment provides 48 screw threads 4 to 224 per inch, 48 power longitudinal feeds 0.0015 to 0.0255 inch, and 48 power cross feeds 0.0004 to 0.0255 inch. Standard change equipment provides 45 threads, 4 to 160 per inch.

Complete specifications are given in Bulletin 5442.

T-3-1991

Tapping Attachment

Tapmatic Corp., 845 W. 16th St., Costa Mesa, Calif., announces the Tapmatic 300 tapping attachment, designed to eliminate human variable lead errors. Operating on the SPV weightless-tapping principle, it requires no spindle pressure by the machine operator during the tapping operation. An axial floating action assures consistently uniform tapped holes. Dimensions and forms of the thread produced depend solely on the tap itself.

Compact yet sturdy, it has only a 1 $\frac{3}{4}$ -in. maximum diameter and 3 $\frac{3}{4}$ -in. over-all length. Constituent parts have



been minimized to reduce maintenance or service.

A reversing mechanism permits instantaneous reversal of the tap at any time, a feature made possible because of angular contact ball bearings which have been used to serve the same function as a planetary gear.

Rated capacity for tapping in steel is from #0 to #6. The company expects to introduce the Tapmatic 500 with capacity from #6 to $\frac{1}{4}$ inch, and the Tapmatic 700 with capacity from $\frac{1}{4}$ to $\frac{5}{8}$ inch.

T-3-1992

Dresser for Disks

A low cost dresser cutter for shaping abrasive disks is announced by Besly-Welles Corp., Beloit, Wis. Features designed to improve dressing performance and increase cutter life are "fingers" which pick abrasive grain from the surface of grinding disks instead of crushing the grain and rolling it off. This cutting action sharpens the disk without changing its grinding characteristics.

A square arbor for the cutter as-



See it work!
Western Tool Show
and
Western Metal Show

color-glance

Brinell Hardness Tester

- Automatically signals relative hardness.
- Speeds up testing cycle with greater economy, yet assured accuracy.

3 colored lights immediately tell you:

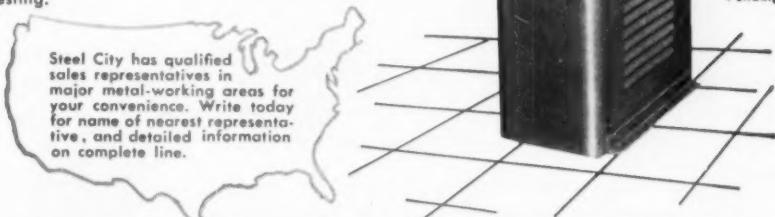
- | | | |
|--------------|----------|--|
| TOO HARD | — yellow | |
| WITHIN RANGE | — green | |
| TOO SOFT | — red | |

The right color flashes automatically during each test

Here is the machine that decides for you which pieces are of proper hardness. Ranges are adjustable, easily set up by using pieces of known hardness or test bars. Color-Glance Brinell Hardness Tester is another Steel City first. For more than 40 years Steel City has designed and built better machines, with your particular application in mind.

Ideal for automation.

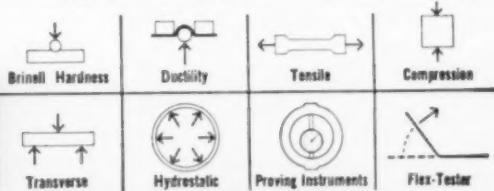
The electrical circuits which operate the color signals can be used to physically sort parts after testing.



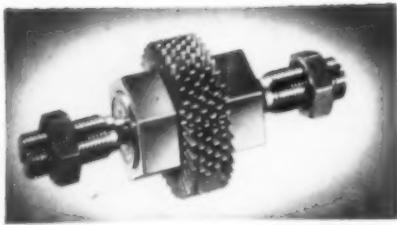
Manufacturers of machines for testing physical properties of metals, including:

Steel City
Testing Machines Inc.

8805 Lyndon Ave. Detroit 38, Mich.



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-199



Spindle Work-Stop

Designed to increase efficiency, accuracy and speed of all second-operation collet and chuck work, the spindle Work-Stop is being marketed by the D. W. Price Corp., 11161 W. Pico Blvd., Los Angeles 64, Calif.

The new accessory is quickly set up and is rigidly locked into the spindle for a positive and accurate stop, regardless of variation in the diameter of work or in positioning collet or chuck.

Spindle Work-Stops come in two sets; one for all 3/4-inch spindle lathes with 1/2-inch collet capacity, and a larger set for 1 1/8-inch spindle lathes with 1-inch collet capacity. Each set consists of complete units with stops both for collet and for chuck work.

T-3-2001

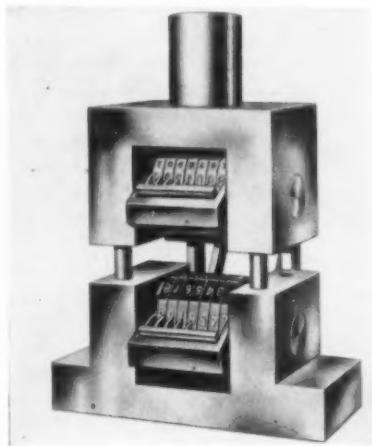
sembly holds the cutters firmly in place with the teeth in staggered position and prevents chewing the arbor spindle.

Buttons pressed into the side of each individual cutter eliminate the need for spacing washers and speed assembly.

This new dresser cutter, called the "Wise Type," is interchangeable with previous cutters used on Besly grinders. They can be adapted to competitive dresser holders.

Embossing Head

The Parker Stamp Works, Inc., Hartford, Conn., announces an embossing head for metal tags, identification plates, seals, etc. This head is constructed in male and female sections to

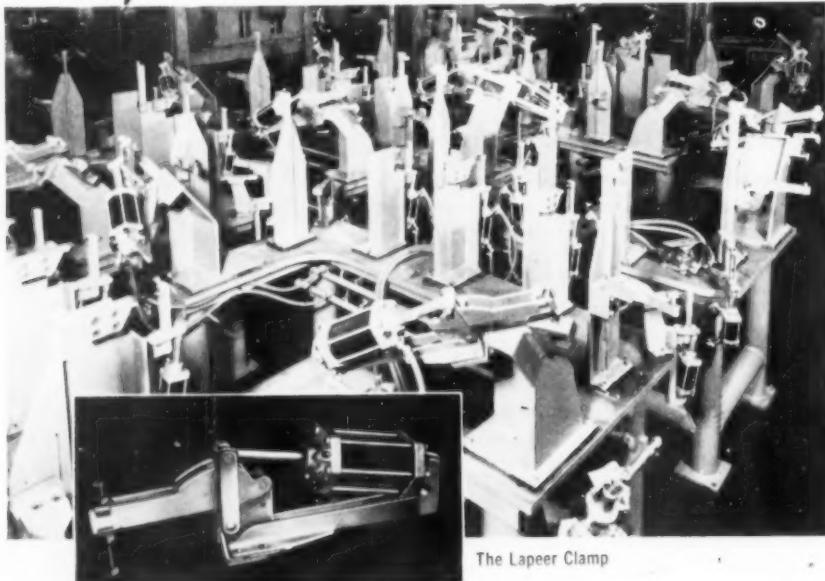


meet specifications of material to be embossed. It gives clear, sharp impressions indefinitely.

Literature giving details about the new embossing head and other marking, embossing, engraving and numbering products is available from the manufacturer.

T-3-2003

IN 60 SECONDS!



The Lapeer Clamp

Truck cowl and plenum assemblies for a leading automotive manufacturer are placed into position, clamped, and spot welded in 60 seconds by one operator as a result of these fixtures engineered by the Martin Electric Co., Detroit.

Important to the production record of this installation is the air-operated, toggle-action clamp made by Lapeer . . . 7 on each fixture. Because they go into action so quickly, they save operator time and fatigue. Because they hold the work so rigidly, the manufacturer attains new horizons in quality control.

It's entirely possible that you have a work-holding problem that will be quickly solved by Lapeer. Better write for information—today.

And send for this free catalog.



**KNU-VISE
PRODUCTS**
3053 DAVISON ROAD

WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ontario

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-200

200

LAPEER MANUFACTURING CO.

LAPEER, MICHIGAN

Digital Counter

A five-bank digital cycling counter, the Model N-655, determining rpm for measuring frequencies, counting events and similar basic measurement applications, has been added to the line of instruments manufactured by Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio.

Counter equipment consists of an amplifier at the input, together with a shaping circuit for converting the input information into trigger pulses suitable for driving high-speed electronic counters. A gating circuit controls flow of information into the counting assembly. This permits counting over a precise time interval. Dividers reduce intervals to 0.01, 0.10, and 1.00 seconds, or, on special order, to 10.0 seconds.

By proper choice of time intervals, the number of events per second, frequency in cycles per second, or speed in rpm can be obtained. Speeds as high as 100,000 counts per second are possible.

An accessory device permits the pre-setting of one or more counts. T-3-2004

The Tool Engineer

Adjustable Adapter Nut

Broken sections are avoided with an adapter nut made by The J. C. Glenzer Co., 1550 E. 9 Mile Rd., Ferndale 20, Mich.

Main feature of the nut is a floating lock that, although it is hinged into



the nut itself by peening so it can't come out, it is a separate piece that moves freely in locking and unlocking.

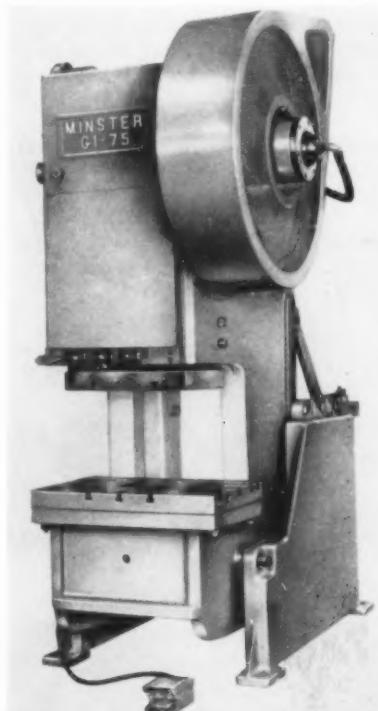
The Glenloc nuts are heat treated and ground for an accuracy of thousandths of an inch, wherever set.

T-3-2011

Gap Press

A line of fixed base and inclinable, flywheel or clutch in gear, fabricated steel, C-frame presses in the 75-ton class is introduced by the Minster Machine Co., Minster, Ohio.

A special feature of the 75-ton presses is the long flanged slide, with barrel type adjustment, designed to eliminate way deflection. The slide ways are unusually long, bronze lined and scraped square to slide face. Rear ways are



90 deg. front 45 deg.

Standard inclining arrangement includes three fixed positions: vertical, 15 and 30 deg. Manual, air power or motorized inclining is available extra. Cast main gears and forged steel pinions are totally enclosed and running in oil. Cast steel and herringbone gears are also available.

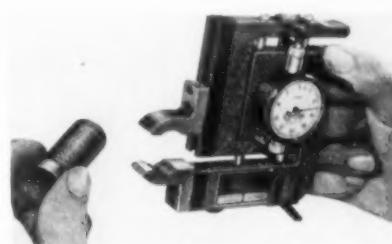
The clutch is Minster patented combination air operated friction clutch and brake.

These presses, identified as GI-75, are easily adapted to automation production and can be equipped with roll, dial or slide type automatic feeds, stock straighteners, oilers and scrap cutters. Standard slide stroke is 4 inches with 90 or 120 strokes per minute on flywheel press and 40 strokes per minute on geared press; bed area is 24 x 36; and slide area 18 x 24. T-3-2012

Versatile Dial Gage

A multipurpose dial unit, the Versa-Dial, is offered by Standard Gage Co., Inc., Poughkeepsie, N. Y., for the checking of internal or external threads, grooves, shallow counterbores, narrow shoulders, and similar work.

Interchangeable segments for contacting the work surfaces to be measured are secured in T-slots at desired



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Drive High Speed
Steel Cutter bores
5 diameters in
steel part.



Special Cutter forms
ball seat in road build-
ing machinery unit.



Tungsten Carbide Tipped
Cutter precision bores three
diameters in aluminum
gear case.



Radial Drive
Tungsten Carbide
Tipped Cutter
bores gear pocket
in oil pump.



Multi-diameter cutter
with Tungsten
Carbide Tipped In-
serted blades for
boring, counterbor-
ing and chamfering.

Since 1913—through two wars and during the peace years—Eclipse has met the exacting and changing demands of industry for special purpose end cutting tools. What better test? What better recommendation? Our large modern plant can serve you, too. Send your problem to us, today!

ECLIPSE COUNTERBORE CO.

Founded in 1913

DETROIT 20, MICHIGAN

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spacing. Such segments are available in a variety of stock types, or special ones can be made. Large dimensions can be checked through the use of longer T-slots or, for even greater dimensions, by trussed extensions. The gages may be equipped with indicators having either 0.001, 0.0005 or 0.0001-inch graduations.

Changing the unit from external to internal usage, or vice-versa, is merely a matter of reversing the indicator, which is a simple operation that can be done by the user.

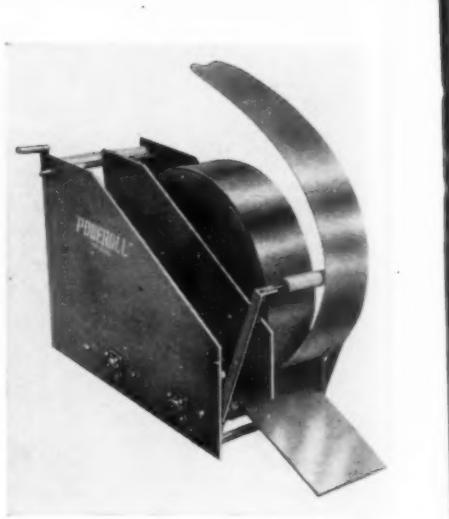
T-3-2021

Coil Cradle

An improved model of the Medelton Poweroll coil cradle, the Model R104 and R204, has been introduced by the Wm. Halpern & Co., Inc., 100 Stevens Ave., Mount Vernon, N. Y.

Three actuating screws acting against a separator plate allow coils to be positioned in the cradle. An additional power driven roller has been incorporated to allow the coil to be driven even when reduced to a small diameter.

Several advantages are provided by



the cradle's design. Simplifying rolling the cradle up the ramp into the cradle loads it. Because a slack look is always available, the automatic feed works more accurately. At no time is there drag on feeds or dies.

A heavy-duty microswitch with a strong positive stop, prevents damage through carelessness or abuse.

T-3-2022

**It's a VERTICAL...
It's a HORIZONTAL!**

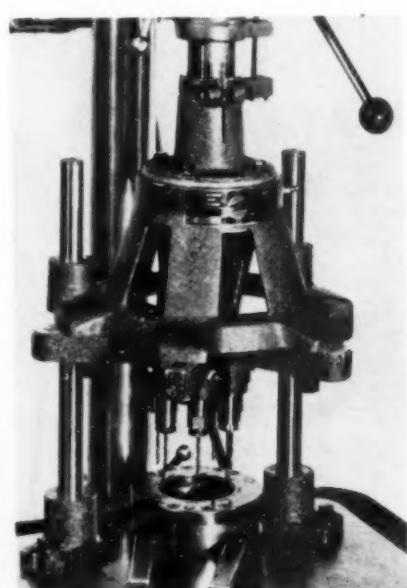
**MAKES
BROACHING PRACTICAL - for any plant
large or small**

- Now, with the new ACME FLEX-O-BROACH, a small, inexpensive, self-contained HYDRAULIC BROACHING MACHINE and PRESS UNIT, you may do HORIZONTAL BROACHING . . . VERTICAL PULL-DOWN BROACHING . . . PUSH BROACHING . . . FORCING . . . STAKING . . . ASSEMBLING . . . CRIMPING and GENERAL PRESS WORK. This unit may be changed from horizontal position to vertical position in a matter of minutes and is low in initial cost and offered to fill the need for highly Universal equipment in connection with secondary operations or for the Job Shop and short production runs not justifying expensive equipment and tooling.

WRITE FOR CIRCULAR AND COMPLETE SPECIFICATIONS

ACME BROACH CORP.
MILAN, MICHIGAN

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in a wider range of hole patterns with a smaller drive to spindle distance than conventional geared or universal joint spindle adjustable heads.

The Model 600 head offers a wide range of adjustment as well as horizontal and vertical utility both tapping and drilling. It is a simple matter to convert the tool from drilling to tapping, or to lead screw tapping.

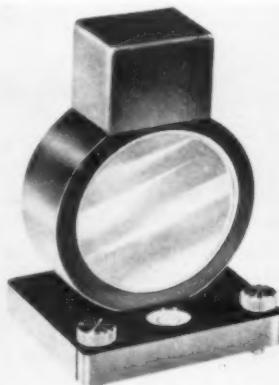
Capacities of the unit range from 1/32 to 5/16-inch drills in steel and #6 to 5/16-inch taps in aluminum. Maximum bolt circle is 6 $\frac{1}{8}$ inches. Minimum center distance between spindles is 15/16 inch.

T-3-2031

Leveling Mirror

The Farrand vertical leveling mirror was developed particularly for use in optical tooling in aircraft by Farrand Optical Co., Inc., Bronx Blvd. and E. 238 St., New York 70, N. Y.

Sturdily constructed and of high sensitivity, this small, compact unit is comprised of a mirror, which is auto-



matically positioned in a vertical plane.

The instrument is insensitive to air currents, temperature changes, static or other types of electrical disturbances, magnetism, heat or cold distortion, humidity, etc.

Autoreflection and autocollimation may be obtained from either side of the mirror assembly by means of an alignment telescope. This provides for quick and easy checking when establishing a vertical plane.

T-3-2032

Watchmaker Lathes

A new series of watchmakers' and precision instrument lathes have been introduced by F. W. Derbyshire, Inc., Waltham, Mass.

These lathes, identified as Model No. 750, have ball bearing headstocks with a runout of less than 0.001 a half inch from headstock. The unit illustrated is equipped with lever collet closer,

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Series PV-600

5000 PSI

PVM MODELS

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The DUDCO PV-600 Series Variable Delivery Pumps give designers and users a source of Fluid Power that sets new standards of efficiency, flexibility, performance AND economy. Design features eliminate excessive heat . . . major cause of accelerated wear, bearing failure and pump deterioration. And, these pumps operate with maximum performance with an exceptionally wide range of hydraulic fluids . . . oils, synthetics and non-flammables.

Available in Pressure Compensated and Hand Wheel Control types. The PVC Models provide integral pressure control where regulation is achieved within the pump itself. At zero flow, the pump operates at normal speed and maintains holding pressure with negligible power consumption. The PVM Models incorporate a manually operated flow regulator that affords accurate adjustment of delivery between the limits of full flow and zero flow. Output of this pump can be speedily adjusted to meet the flow requirements of the machine being operated.

Get all the facts on this PV-600 Series. Write for Bulletin DP-350 and other new developments in DUDCO DUAL-VANE PUMPS and MOTORS.

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INTERNATIONAL SALES OFFICE, 90 WEST ST., NEW YORK 6, N. Y.
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-203





Portable Induction Heater

Lepel High Frequency Laboratories have developed a compact and completely self-contained high frequency heating unit combining an induction heating generator with a refrigerating water recirculator.

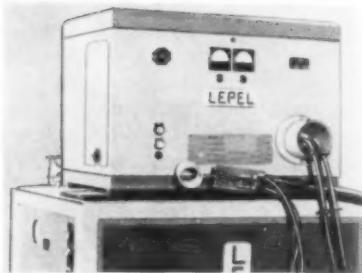
Prime among its advantages are its easy portability. In addition, the need for water supply and drainage connections has been eliminated; once filled, there is no water consumption at all since the water in the unit is constantly refrigerated and recirculated. Long flexible leads between the unit and the work coil are advantageous where the work to be done is at a distance from the generator.

This compact unit also can be used effectively for soldering, brazing and heat treating ferrous and nonferrous

V-belt, six-position turret, double-compound slide rest with rack and pinion cross slide and a front toolpost swinging 360 deg.

Specifications of the lathe are 24-in. over-all length; 22-in. length of bed; 2.953 swing over bed and 5.905 swing of lathe.

Spindle speeds, with variable speed drive, are 590 to 4700 rpm with a 1 to 1 pulley ratio and 1180 to 9400 rpm with a 2 to 1 pulley ratio. **T-3-2041**



metals. A versatile, moderately priced unit, the Model RRP, operates on 110 or 220 volts, single phase. A stepless Thyatron power control makes it easy to select the proper power output.

T-3-2042

Tap Tool

A tap tool designed for high-speed, super sensitive tapping of 0-80 to 4-40 holes in steel and other metals and plastics, has been placed in production by Armite Laboratories, 6609 Broad St., Los Angeles 1, Calif. The tool has a Morse #2 tapered shank with a telescoping spindle which provides for ver-



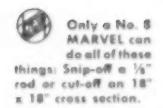
tical travel of the tap, a knurled control collar to provide maximum feel of the tapping operation, and a lock screw arrangement which engages an overload clutch for small taps and disengages for #2 and #4 taps. Light downward pressure applied to the collar drives the tap into the work and only a light upward pressure reverses it. The head is readily adaptable for through or bottom tapped holes. Performance indicates that jobs such as tapping 0-80 holes in steel can be performed at a rate of 10 holes per minute. **T-3-2043**

Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Rough to Size and Shape



Miter



Index



Cut off and shape Structural Beams



"Rough Machine" to size and shape with minimum chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL Metal Cutting
SAWS.
Letter Machines - Cutter Machines

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-204

Space-Saving Cylinder

Development by the Rotex Punch Co., 2350 Alvarado, San Leandro, Calif., has resulted in an air, water and low-pressure hydraulic cylinder that offers maximum space saving by utilizing mountings only as wide as the actual cylinder body. This simplicity in design without sacrificing quality or adaptability makes it possible to mount a series of cylinders side by side within a minimum of space. Mounting attachments are fastened in a normal manner to aluminum cylinder heads.

Automatic or adjustable cushions



may be used on any of the Rotex cylinders. There are four standard models in diameter sizes of $1\frac{1}{8}$, 2, 3 and 4 inches. Air maximum operational pressure is 160 psi, while maximum pressure for hydraulic use is 360 psi.

Cylinder ports may be placed at the top, bottom, side or any position that is convenient for an assembly. A complete line of interchangeable mountings are available including: L mount, foot mount, flange mount, rear clevis, clevis bracket, piston rod clevis and nose mount.

T-3-2051

USE READER SERVICE CARD ON PAGE 231 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Universal Chuck

An all-purpose, universal work-holding tool designed to save setup time and eliminate custom tooling has been announced by Micro-Chuck Div. of Scott-Browne Corp. Completely adjustable, this precision Micro-Chuck unit can be used repeatedly for holding a variety of different regular and odd-shaped pieces of work.

The Micro-Chuck and adaptor, the basic tool, attaches directly to the spindle of a lathe. The face of the Micro-Chuck contains a boss on a slide, to which various work-holding attachments can be locked. The attachment can be adjusted through a full 360 deg on the boss, and the boss can be moved up or down the face of the Micro-Chuck on the slide, to bring any point of the work to exact spindle center.

The Micro-Chuck comes in 8, 9, and 12 inch diameter sizes.

Complete details are contained in literature available from Micro-Chuck Div., Scott-Browne Corp., Dept. 149, Newton, Ohio.

T-3-2052



Variable Speed Drive

Motors for the U. S. Varidrive, made by U. S. Electrical Motors Inc., Box 2058, Los Angeles 54, Calif., have been increased from 50 to 60 hp to provide for extra heavy-duty services where variable speeds are needed. This power increase broadens the application of variable speed. The larger capacity motors may also be equipped with either mechanical or electrical remote controls. The 60-hp motors are equipped with dual varibelts of double-ribbed design which divide the transmissions load so that excessive strains are avoided.

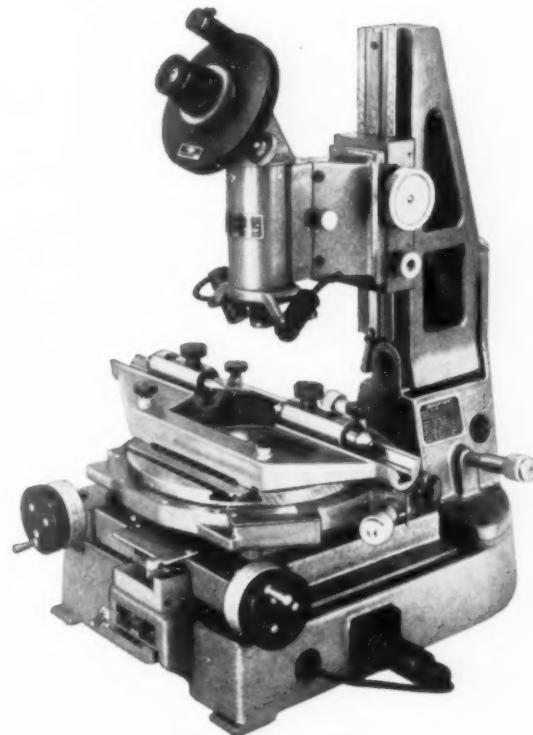
T-3-2053

Flexible Locknuts

A locknut addition to its Flexloc line, announced by Standard Pressed Steel Co., Jenkintown, Pa., is designed to withstand excessive tightening torques, heavy vibration and stresses.

Primary advantage of the series which is made with eight threads to the inch, is the helix of the thread which can secure high pressure without excessive wrenching. The all-metal one-

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PRODUCTION PARTS USE THE
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THE GAERTNER SCIENTIFIC CORPORATION

1241 Wrightwood Avenue

Chicago 14, Illinois

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-205

piece design permits the fastener to serve as a stop nut as well as locknut.

Gripping ability is derived from its slotted top where six equal segments are closed in to make the inside diameter of the Flexloc smaller than that of the matching bolt. Thus, it locks immediately when it is placed on the bolt and will hold tightly at any position. It does not gall.

Diameters of the new Flexloc range from one to two inches with intermediate sizes available at one-eighth inch intervals.

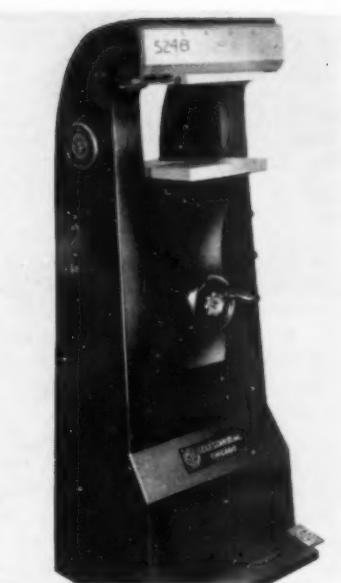
T-3-2061

Hydraulic Marking Machine

A development in hydraulic marking machines, recently announced by Geo. T. Schmidt, Inc., 1810 Belle Plaine Ave., Chicago 13, Ill., is the model 365 junior unit that provides all the functions of larger heavier machines for normal marking operations, requiring up to 800 lbs maximum pressure.

It will mark flats up to 5-inch thick and rounds up to 5 inches in diameter.

Rounds rotated in a cradle can also



be marked up to $3\frac{1}{8}$ inches long, using a straight die or typeholder. Rounds which will roll on the table can be marked up to $1\frac{1}{16}$ inches long. Possible production rate ranges from 800 to 1000 parts per hour.

Several design features have been incorporated in this machine, including one-piece frame, simplified die stroke adjustment, single, conveniently located pressure control knob, and safety light.

T-3-2062

EDLUND

Model 1F

1

Vari-Speed Control and Indicator Infinitely variable spindle speeds up to 10000 RPM. Simply turn knob for any speed within range of machine. Swift, Powerful, Positive Action.

2

Micrometer Graduated Depth Gauge Permits accurate prepositioned depth control for precision drilling. Clearly graduated to .001".

3

Adjustable Spindle Tension Control Compensates for weights of various drills. Three-handle feed lever lets operator choose best feeding position.

Specifications

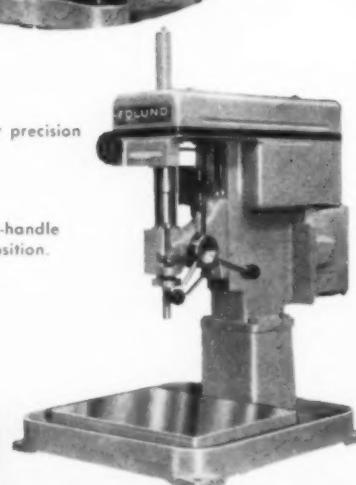
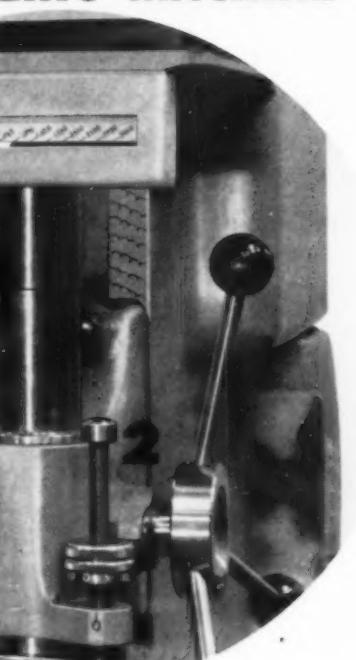
Overhang.....	7"
Capacity (Cast Iron).....	$\frac{3}{8}$ "
#1 Morse Taper or Jacobs Chuck.....	0- $\frac{3}{8}$ "
Speed Range—Optional.....	625 to 5000 RPM 1250 to 10000 RPM

Pedestal or Bench Models

Send for Free Illustrated Bulletin #160

EDLUND
MACHINERY CO.

Division Bradley-Edlund Corp., Cortland, N.Y.



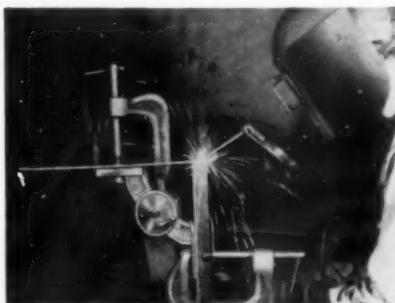
EDLUND PRECISION ENGINEERED

EDLUND PRECISION ENGINEERED EDLUND PRECISION

Workholder

An adjustable workholder that holds two parts at any angle in a vice-like grip is announced by Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland, Ohio. Two clamping faces of the tool, called the Jergens Duo-Square adjustable work holder, are adjustable from 0 to 180 deg and are precision machined for accurate alignment. Adjustments are simple to make to any desired angle.

Cast aluminum alloy, which has been used to make the tool, quickly dissipates heat, and weld splatter will not adhere. The other advantages of the holder is that it cuts setup time, assures accurate angles, increases jig flexibility and aids precision. T-3-2063



Affiliated with Precision Castings Co., Inc.

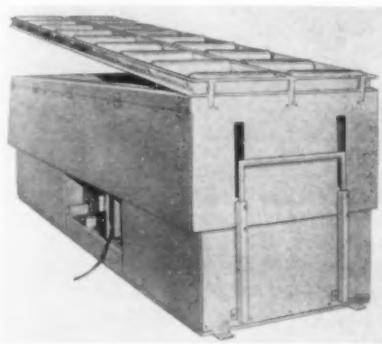
Edlund Representatives in Major Cities

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-206

Lifting Table

Union Tool Corp., Warsaw, Ind., announces a conveyorized elevating table designed to handle long sheets of material being fed into a machine where sheet size presents a problem. A roller-conveyor type top, 40 inches wide x 144 inches long, is hinged at one end to permit raising the opposite end. Ratchet-type stops permit its raising in increments of 3 inches, from 0 to a maximum of 18 inches.

Frame of the machine is of welded steel construction, mounting four ad-



justment screw assemblies powered by a 3-hp motor; an inching button mounted 24 inches from the offbearing end of the table permits the operator to raise and lower the table top through a 16-inch range of adjustment from a minimum height of 32 inches to a maximum height of 48 inches. The entire machine is sheet metal enclosed, and the linestarter and microswitches are mounted on a panel recessed in the side wall on the operator's side.

Load capacity is 12,000 lb, although other sizes are available. **T-3-2071**

USE READER SERVICE CARD ON PAGE 231 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

Abrasive Belt Machine

The Curtis Machine Corp., Jamestown, N. Y., offers a small conveyorized all-purpose grinding, polishing, and deburring machine. The bench type, abrasive belt machine, called the Curtis Model 304C, can handle all types of material, provides high production rates and low equipment cost.

Drive motor for the conveyor belt has an infinitely variable speed, permitting flexibility for various types of work, drive motor for the spring tensioned coated abrasive belt drives at 3600 rpm. The 54-inch belt, which is 4 inches wide, can be changed and tracked in a few seconds. A handwheel at the front

**Proven
PERFORMANCE.....**

...for all
GROOVE inspection

"O" RING GROOVES
SNAP RING GROOVES

adjustable **GAGES**

Standard models
for checking from
1/4" bore dia. to 5".

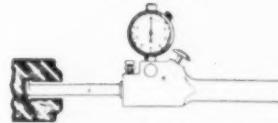
... Light, easily handled
gages with a wide
range of gaging
applications.



... with quickly
interchangeable
extensions and
gaging contacts.

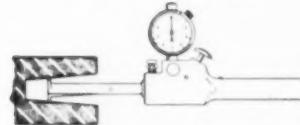
Standard models available for
checking snap ring grooves

RECESSES



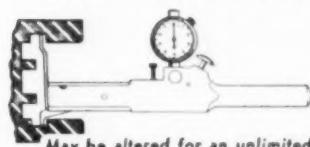
Gaging recess in blind hole.

TAPERED HOLES



Gages taper or bell mouth.

SPECIAL APPLICATIONS



May be altered for an unlimited
number of special applications.

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OTHER	RELIANT	GAGES	FOR	DIMENSIONAL	CONTROL
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Gages for
Groove Location
and Depth.



Tooling Balls
and Accessories



Multi-
purpose
Snap
Gages

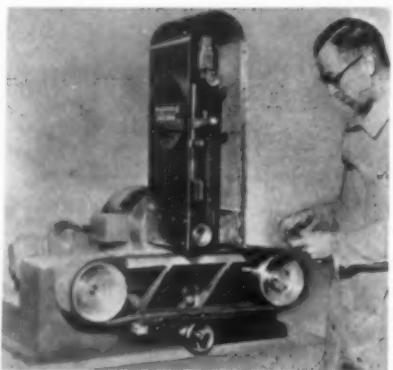


Special
Setting Masters



PRECISION GAGING EQUIPMENT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-207



Shop Press

A low-priced electric-hydraulic shop press has been developed by Dake Engine Co. that offers unusual construction and operating advantages for this type equipment.

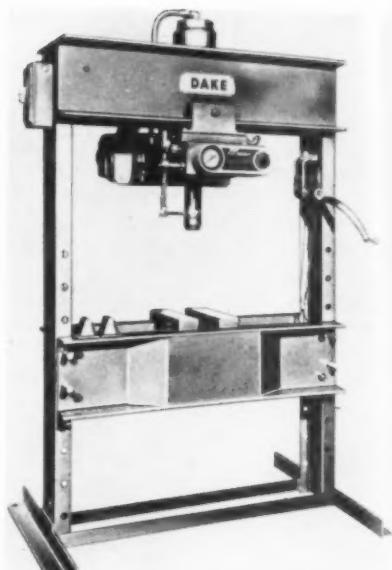
One feature of special interest is the rapid ram approach which eliminates the use of a handwheel. When the control knob is turned, the ram advances at high speed until it comes in contact with the work, then automatically changes to the power stroke. Speed of the ram is completely variable from zero to maximum under fingertip control by the operator. The knob automatically turns to "Off" position when the hand is removed. All controls and gages are placed at convenient working height, in a control panel.

The workhead, which also may be

of the machine adjusts the grinding head for variations in stock thickness and regulates the grind pressure.

Multiple grinding heads for rough to finish grinding operations are available at extra cost.

T-3-2081



purchased separately is self-contained, and is readily movable to center over the work. The ram has a full 10-inch stroke.

Bulletin No. 347, available from Dake Engine Co., Grand Haven, Mich., contains full details about the unit.

T-3-2082



ARMSTRONG

Each year ARMSTRONG TOOL HOLDERS become more important to you

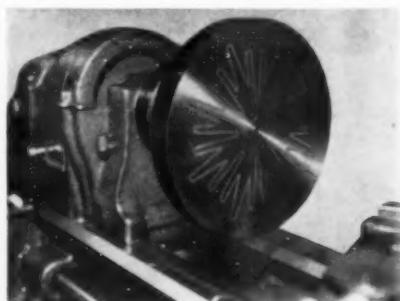


The ARMSTRONG Thread-rolling Tool takes interchangeable high speed steel form-cutters which require only flat top grinding to resharpen—always hold their true thread form.

Write for catalog

ARMSTRONG BROS. TOOL CO.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-208



Lathe Magnet

A 10 and 12-inch diameter electromagnetic chuck has been announced by Magnetic Holding Devices, 2034 E. 22nd St., Cleveland, Ohio, for application on lathes, grinding machines and special machines.

Features of this lathe magnet are its low weight-ratio to its face diameter, and its greater and more even distribution of magnetism on the magnet face.

Better distribution of magnetism is attributed to the new magnetic pattern of the face, called Crow Foot. The pattern has 48 radial magnetic gripping edges equal to 91 lineal inches of magnetic engagement on a 10-inch diameter face. The magnet, which is readily adapted for mounting on small or large size spindles, is equipped to stand up under coolants, oils, mild acids and alkalis.

T-3-2083

SOUTH BEND LATHE ATTACHMENTS

- Increase Lathe Versatility
- Simplify Difficult Jobs
- Perform Special Classes of Work



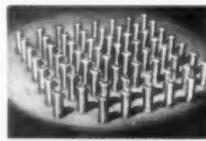
Handlever Collet Attachment



Telescopic Taper Attachment



Adjustable Collet Bushing Chuck



Steel and Brass Collets



Safety and Standard Lathe Dogs



Telescoping Jaw Follower Rest and Center Rest



Micrometer Carriage Stop



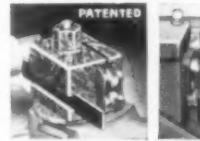
Handwheel Collet Attachment



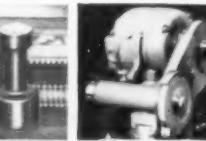
Milling Attachment



Ball Bearing Live Center



10 in 1 Tool Holder



Thread Dial Indicator



External Grinder

Centers,
Drill
Pads



Write for Catalog 5418

SOUTH BEND LATHE

Building Better Tools Since 1906
South Bend 22, Indiana



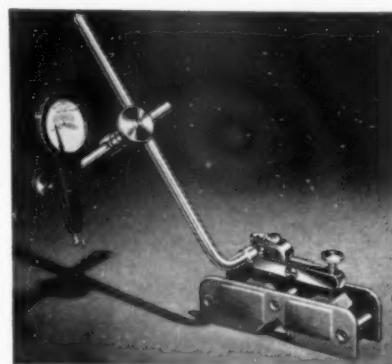
INDICATE A-3-209-1

March 1955

Dial Indicator

Dependability, precision and economy are combined in the dial indicator announced by Cullen Mfg. Co., Racine, Wis. The unit is complete with swivel adaptor and magnetic base holder with precision adjustment.

The dial indicator, which has fully enclosed dials, reads from both sides,



and is easily read at arms length. Crystals are nonbreakable and dust proof. Telescoping contact points are quickly and easily changed.

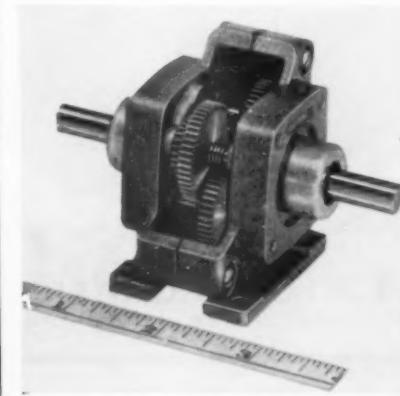
Range is 0.000 to 0.010; or with $\frac{1}{2}$ -inch extension contact, the range is increased from 0.000 to 0.030. For universal flexibility, the indicator mounts quickly on swivel adaptor which in turn mounts on the holding rod of the magnetic base unit that has a 50 pound pull and attaches instantly to any ferrous surface.

T-3-2091

Speed Reducer

Series 11 Bantam speed reducers that have an anti-backlash feature are now offered in the line made by Metron Instrument Co., 432 Lincoln St., Denver 3, Colo.

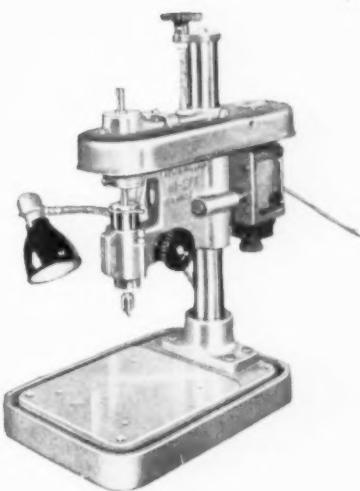
Lack of backlash results from two parallel gear trains that are spring loaded against each other; thus, backlash is continuously taken up whether running or not. The torsion spring is wound to give an anti-backlash torque



Sensitive Precision

"HI-EFF"

DRILLING MACHINES



Ideal for both toolroom and production drilling, where accuracy is an important factor.

Widely used for small orifice work.

Variable speed, with hole drilling range .001" to $\frac{1}{8}$ ".

Write for Bulletin 181

DYNAMOMETERS • STATIC BALANCING MACHINES
PRECISION DRILLING MACHINES

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A.S.T.E. Show in Los Angeles

TAYLOR DYNAMOMETER and MACHINE COMPANY

6411 RIVER PARKWAY

DEPT. E, MILWAUKEE, WISCONSIN

INDICATE A-3-209-2

209

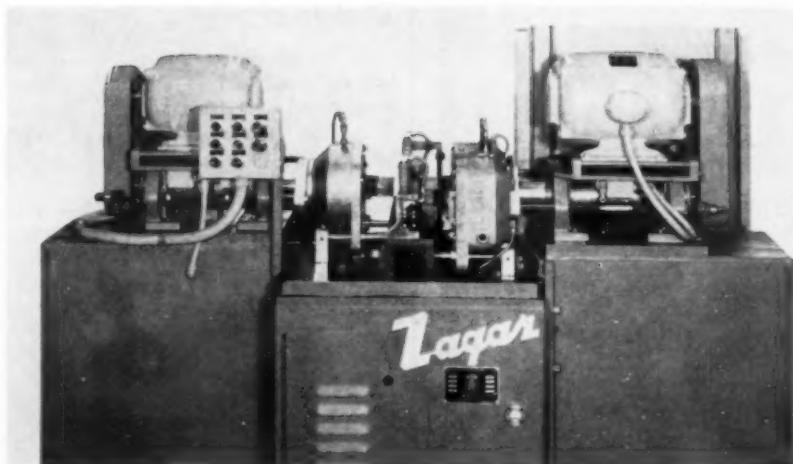
of 2 lb/in. either direction. Where maximum output torque is not needed, spring torsion may be reduced to permit lower input torques.

Suitable for a broad range of applications, they may be obtained in any of 600 standard ratios. **T-3-2101**

Drilling Machine

A special horizontal drilling machine designed by Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, Ohio, primarily for an automatic transmission assembly, but suitable for a wide variety of setups, produces steel inserts (sprags), $\frac{3}{8}$ inch square.

Interlocked electrically for automatic



WANT SOMETHING **EXTRA** in a SURFACE GRINDER



HYDRAULIC FEED MODEL

BOYAR-SCHULTZ CORPORATION
2004 South 25th Avenue, Dept. D-M, Broadview, Illinois

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-210

operation, the machine has two hydraulic feeder units and two gearless drill heads. Twenty holes are drilled from one side in a rectangular rod of extruded bar stock at the first station, and the work is indexed manually to countersink the 20 holes from both sides at the second station. The bar is indexed progressively until a ten-foot piece is completely drilled. It is then put through an automatic punch press that cuts the bar into the sprags.

Potential production of this unit is 3600 holes per hour. Tooling can be adapted to many jobs. **T-3-2102**

USE READER SERVICE CARD ON PAGE
231 TO REQUEST ADDITIONAL TOOLS
OF TODAY INFORMATION

Straightening Unit

The Brandes Press Co., 6408 Euclid Ave., Cleveland 3, Ohio, has introduced a complete line of combination coil cradle and straightening machines. Particularly designed for use with Brandes presses, they also can be used with other metal-stamping presses and forming machines.

Compact to conserve floor area, they are both sturdy and flexible enough to carry heavy weights. Models are available to handle coil weights from 2000 to 10,000 pounds with widths from 8 to 24 inches.

The cradle is of conveyor-type construction with guide plates that rotate with the coil to prevent crimping or damaging the edge of the material. The leveling or straightening unit is available with either five or seven power driven, easily adjusted rolls and one or two sets of pinch rolls.

Units are powered by a 4 to 1 variable speed drive, which yields a wide range of feeding speed from 30 to 120 fpm.

All electrical controls are built to JIC standards. **T-3-2103**

Field Notes...

Largest automatic plating facility in the world is getting into full operation at Chevrolet Motor Div.'s spring and bumper plant in Livonia, Mich. Capable of producing an automobile bumper every three seconds, the installation plates raw stock in three straight-line machines that total nearly a third of a mile long.

Loads of 335 tons of steel bars are carried through a two-and-a-half hour, 31-step process of cleanings, washings, rinsing and platings. Except for loading at the start, and unloading at the end, the entire process is carried on automatically through an unusual application of elevators and shuttles.

The three lines, operating independently, are capable of turning out a total of four acres of plated surface in 16 hours.

v v v

Resumption of limited stud manufacturing operations at its western regional headquarters in San Leandro, Calif. has been revealed by The Nelson Stud Welding Div. of Gregory Industries, Inc. The work will be located at the factory branch warehouse of the firm, original location of Nelson's stud welding business prior to its move to Lorain, Ohio in 1945.

contest

A \$12,000 Machine Tool Design Award Program is being sponsored by the James F. Lincoln Arc Welding Foundation. Papers describing the use of arc welding in machine tool design will be considered for competition. A price of \$3,000 tops the 15 awards to be made for the best papers submitted.

expansions

Opening of a new plant at Elk Rapids, Mich. has been made public by Super Tool Co. The additional 20,000 sq ft facility expands the company's production of certain standard items which are being transferred to that plant from the Detroit facility.

v v v

Construction of a \$500,000 shipping and receiving building is under way for The Cleveland Crane & Engineering Co. Completion is expected by the middle of May.

The recently completed million-dollar plating plant of Standard Pressed Steel Co. has been opened to precision job plating from outside firms. Although the plant was built primarily to electroplate and surface treat SPS products, the excess capacity engineered into its nine separate plating lines makes it practical to make its facilities open. Two of the largest small-parts plating lines in the country are included in this facility.

Openhouse marked the official opening of Jones & Laughlin Steel Corp.'s new Warehouse and Container Div. plant at Lancaster, Pa. The completely new building, comprising about 100,000 sq ft of floor space will house approximately 40 employees initially. This is the third addition to the company's warehouse division in the past 20 months.

corporate changes

According to an announcement from Sundstrand Machine Tool Co., Sundstrand Hydraulic Div. is now a separate entity with a new plant, new name and its own management, sales, engineering, service and production facilities. Al-

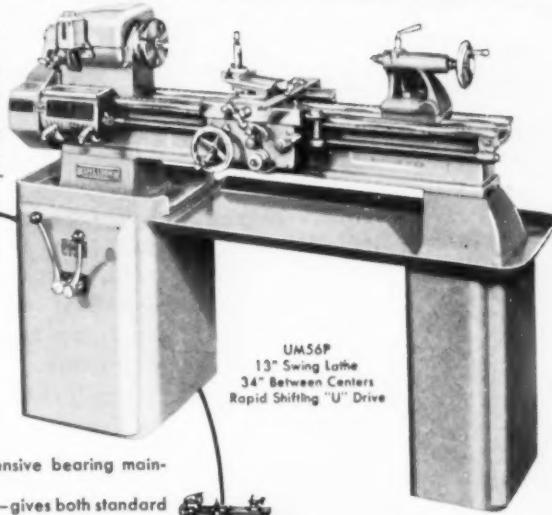
SHELDON

CHICAGO U.S.A.

BUILT

• • • to Turn out PROFITS

Sheldon Lathes are designed and built to do accurate lathe work rapidly and profitably. Moderate in price they have the collet, swing and power capacity to do most toolroom work.



Design

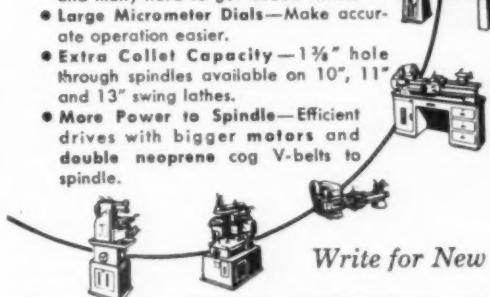
Features:

- Large and wide "Zero Precision" Tapered Roller Spindle Bearings—permit operation at all speeds, retain accuracy, end expensive bearing maintenance costs.
- 54-pitch Gear Box—gives both standard and many hard to get thread ratios.
- Large Micrometer Dials—Make accurate operation easier.
- Extra Collet Capacity—1 1/8" hole through spindles available on 10", 11" and 13" swing lathes.
- More Power to Spindle—Efficient drives with bigger motors and double neoprene cog V-belts to spindle.

UM56P
13" Swing Lathe
34" Between Centers
Rapid Shifting "U" Drive

OPTIONAL FEATURES AT EXTRA COST

include: Hardened ways, Long Tapered Key Drive Spindles, 4" D1 Camlock Spindles bed turrets, collet attachments, and other production and toolroom accessories. Lathes available with a choice of "Bench," "Cabinet" or "Pedestal" mountings.



Write for New Catalog G-55

SHELDON MACHINE CO., Inc.

4229 N. Knox Ave.

Chicago 41, Illinois

See our display at the Western Metal Show, Booth 614

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SPECIAL INTRODUCTORY UNIT



WHISTLER 10 HOLE MAGNETIC PERFORATING DIE

**Cut die costs
drastically,
start
production
quicker**

This M-12-14 Complete Introductory Unit includes a set of blank templates, ten punches, dies, strippers and punch and die retainers complete to make up a ten hole precision perforating die. Any diameters from $\frac{1}{8}$ " to $\frac{1}{2}$ " to your selection. Catalog illustrates additional re-use economies.

\$675 NET
F. O. B.
OUR PLANT

**WHISTLER DIES ARE CUTTING COSTS
FROM COAST TO COAST**



SEND FOR CATALOG Illustration shows how quick and simple it is to set up a Whistler Magnetic Perforating Die ready for production. Larger standard units can be added to suit your requirements.

S. B. WHISTLER & SONS, INC.

*Manufacturers of Adjustable, Magnetic and Custom
Built Dies for All Industry*

744 Military Road

Buffalo 23, New York

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-212

though basically it will operate independently, it remains a division of the parent company. A. H. Swenson, who has 20 years' experience with the company, has been made manager of the new division.

✓ ✓ ✓

Corporate name of the Lehigh Foundries, Inc. has been changed to Lehigh, Inc. Reason for the alteration was in order to better represent the diversification of products made by the company.

✓ ✓ ✓

Managements of the Gardner-Denver Co. and the Keller Tool Co. have announced consolidation of the two firms. Keller Tool now becomes Keller Tool Div. of the second company, but will continue operations under the former Keller management. E. V. Erickson, president of Keller, has been elected executive vice-president of Gardner-Denver.

✓ ✓ ✓

Air Appliance and Industrial Filtration divisions of the United States Hoffman Machinery Corp. have been combined into the Industrial Equipment Div. Revis L. Stephenson, who has been general manager of the Air Appliance Div., was promoted to the position of vice-president in charge of the new organization.

✓ ✓ ✓

Announcement of consolidation of Chicago Belting Co. with its two subsidiaries, Allis Rubber Corp. and the Allis Seal Corp., has been made by Edward H. Ball, president of the company. The new corporation is called the Chicago-Allis Mfg. Corp.

MOVES

Executive and sales offices of the Vanton Pump & Equipment Corp. have now been moved to the company's plant location at 201 Sweetland Ave., Hillside, N. J. in a step toward consolidation of management, sales and engineering activities.

✓ ✓ ✓

Offices of the American Society for Engineering Education have been moved to the University of Illinois, Urbana, Ill. Move was occasioned by the appointment of Prof. W. Leighton Collins as secretary of the organization.

✓ ✓ ✓

Detroit sales office of the Motch and Merryweather Machinery Co. has been moved to larger quarters at 23520 Woodward Ave., Ferndale, Mich. J. Milton Wells, who has been with the firm

The Tool Engineer

for 25 years, was made manager of the office, and Robert L. Morrison, with 12 years' service, became assistant manager. Mr. Wells is a member of ASTE's Detroit chapter.

✓ ✓ ✓

Detroit District office of Worthington Corp., has been moved to 13305 Puritan Ave. The new quarters will provide the company with considerably enlarged facilities for sales and clerical staff serving the Michigan area.

new ventures

Formation of the Delta Welder Corp. in Detroit was announced recently by the new company's president, Harry E. Day. The company will design, engineer and manufacture high production special and standard resistance welding machinery and automation equipment for the metal fabricating industries.

✓ ✓ ✓

New operating unit for the Carborundum Co. has been established to manufacture and sell silicon carbide and fused alumina abrasives, abrasive grain and related electric furnace products in the United States. The step was taken as part of the company's policy to decentralize and specialize along basic produce lines.

✓ ✓ ✓

An east coast office and warehouse has been established by Benchmaster Mfg. Co. Location of the organization, to be known as Benchmaster Parts Co., is 519 S. 5th Ave., Mt. Vernon, N. Y.

✓ ✓ ✓

Canadian industry is offered availability of precision gages and chucking tools with the establishment of the N. A. Woodworth, Canada, Ltd. at 211 Greenwich St., Brantford, Ontario.

sales

Donald J. Lewis has been made sales representative in the Western territory for standard products and contract manufacturing activities of The Taft-Pierce Mfg. Co. His business location is 3690 Santa Fe Ave., Los Angeles 58.

✓ ✓ ✓

David A. Wallace is now sales manager of Cincinnati Lathe and Tool Co. Concerned with Cincinnati Lathe sales since 1949, he has been assistant sales manager for the past four years.

✓ ✓ ✓

Appointment of Fred L. Bishop of Atlanta, Ga., as manufacturer's representative in the Virginia, North Caro-

Only 4 seconds to make this oil and air-tight joint with EASY-FLO 45



HERE'S A TYPICAL EXAMPLE of the reasons why the EASY-FLO low-temperature silver brazing alloys are so extensively used in the automotive and aviation industries. It shows how easy it is to get fast production of high-strength liquid and gas-tight joints with these alloys. And note that no brazing skill is needed. All this adds up to metal joining costs that are surprisingly low.

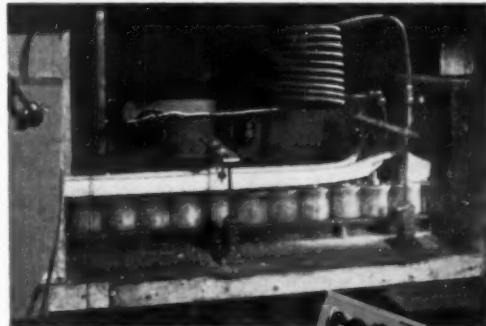


EASY-FLO 45 WIRE RING



The unit is a pressure switch which is part of the Studebaker anti-creep "hill holding" device. The job is brazing the threaded spud into the cover. Operator sets covers in cylindrical holders on an endless chain and in the covers she places the spuds, each one with a ring of EASY-FLO 45 preplaced. Assemblies pass thru an induction heating coil (below) - 14 a minute.

Photos and data courtesy of FASCO Industries, Inc., Rochester, N.Y.



FOR EASY-FLO FACTS IN PRINT . . .

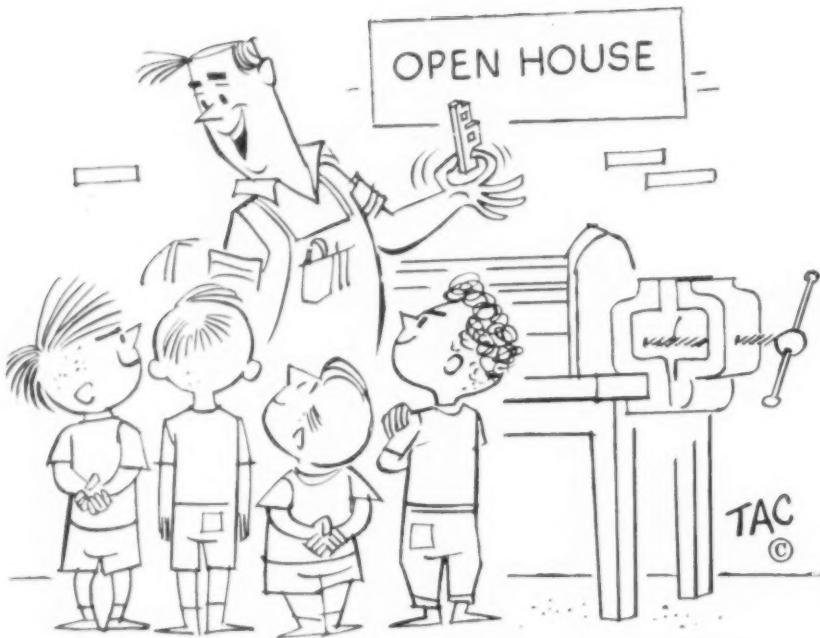
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"...these dies are so tough even you kids can't destroy them. They're made of ATMODIE® air hardening die steel."

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DEKA-BORE Model A-2



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DEKA-BORE (and only DEKA-BORE) can be adjusted in fractions of 1/10,000" on the full diameter as easily as reading 1/16" on a steel rule. NOT A VERNIER OR SCROLL ADJUSTMENT. Can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

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 Free literature and prices.

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TE-3

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-214

lina, South Carolina, Georgia and Florida, has been announced by Horton Chuck Div. of the E. Horton & Son Co.

✓ ✓ ✓

Wilton Tool Mfg. Co., Inc. has made Alex J. Vogel vice-president for sales and William J. Ferrick sales manager of the company. They formerly were sales manager and assistant sales manager respectively.

purchases

Ownership of the Erwin Loewy Hydropress interests has been acquired by Baldwin-Lima-Hamilton Corp. as part of its diversification program. Purchase involved 100 percent stock ownership of Hydropress including its wholly owned subsidiary, the Loewy Construction Co., Inc. Erwin Loewy remains as president of both the acquired company and its subsidiary.

✓ ✓ ✓

The line of tap extensions formerly made by the Allen Manufacturing Co. has been added to the products made by The Walton Co. and will be produced under the name of Walton tap extensions. The transaction included all manufacturing and selling rights.

✓ ✓ ✓

The Carborundum Co. has acquired the Curtis Machine Co. from Lincoln Park Industries, of which Curtis Machine was a wholly-owned subsidiary. To complete the transaction, Carborundum exchanged 8696 shares for the entire capital stock of Curtis Machine. Gene DeMambro, president of Lincoln Park Industries, will continue as president and general manager of Curtis Machine.

✓ ✓ ✓

Mercast Corp. has acquired the entire stock interest in its licensee, the Alloy Precision Castings Co., held by National Bronze & Aluminum Foundry Co. Management of Alloy Precision is to remain the same, although membership of its board of directors will be altered as a result of the transaction.

✓ ✓ ✓

The hob business of Brown & Sharpe Mfg. Co. has been sold to Barber-Colman Co. Included in the sale were the machines and tools used in manufacturing the hobs, and this equipment is currently being moved to the Barber-Colman plant in Rockford, Ill.

✓ ✓ ✓

Acquisition of certain assets of the Hall Automotive Equipment line of the Waterbury Tool Div. of Vickers has been revealed by Baker Brothers, Inc. Production of Hall valve seat grinding

The Tool Engineer

machines and allied equipment has been transferred from Waterbury, Conn. to Toledo where it will be carried on under the name of Hall-Toledo. The purchase is in line with the company's plan to expand operations by diversification of product.

✓ ✓ ✓

Colson Corp. has become a wholly-owned subsidiary of F. L. Jacobs Co. Robert A. Pritzker, Colson president, will remain operating head of that organization, and present management team will be retained according to official announcement. Manufacturing facilities are to remain in Elyria, Ohio, and in the plant at Somerville, Mass.

✓ ✓ ✓

Federal Machine & Tool Co., Inc., has acquired both the Atlantic Carbide Co. and Colonial Tool & Cutter Co. In the future, the company will be operated as Federal Carbide & Cutter Co., Inc. and will be affiliated with Federal Machine & Tool and its subsidiary, Federal Services Co.

✓ ✓ ✓

Assets of Fray Machine Tool Co. have been acquired by U. S. Industries, Inc. Fray operations will be moved into the Vernon plant of U. S. Industries' Axelson Mfg. Co. Div. at Los Angeles which already has a line of engine lathes so no additional equipment will be required to make the Fray line. Purchase was in line with the product diversification program of U. S. Industries.

✓ ✓ ✓

Trans-American Precision Instrument Corp. has become a division of Sterling Precision Instrument Corp., and will now be known as the Instrument Div. Both general offices and manufacturing plant will remain at the same location, 34-17 Lawrence St., Flushing 54, N. Y. There will be no changes in either executive personnel or general operating procedures.

more sales

John B. Dempsey, Detroit branch manager, has been made manager of electric tool sales of Thor Power Tool Co. He has been a member of the Thor sales department for 17 years. Otto Shellenberger, a Detroit service engineer since 1951, was named to succeed Mr. Dempsey as branch manager in that office.

✓ ✓ ✓

Steel Specialties, Inc., 5000 E. Monument St., Baltimore, Md., is now exclusive sales agent for Vulcan tool steels in the Baltimore sales district, according

to an announcement released recently by Vulcan Crucible Steel Co.

✓ ✓ ✓

New general manager of sales for Joseph T. Ryerson & Son, Inc. is Weaver E. Falberg while John A. Houston, who has been assistant sales manager of the Chicago plant, succeeds him as assistant general manager of sales.

✓ ✓ ✓

Representatives for the Hartford Special Machinery Co. in the North Central area are Walter H. Brooke Machine Tools, 5740 W. Chicago Ave..

Chicago; Machinist Tool Co., 103 Hall St., Rockford, Ill.; The Tool Crib Inc., 4221 Excelsior Blvd., St. Louis Park, Minneapolis; and Shively Bros., Inc., 719 E. Second Ave., Flint 3, Mich.

✓ ✓ ✓

Several sales appointments have been announced by Brown & Sharpe Mfg. Co. Earl P. Leeds was made assistant general sales manager, and in addition will assume responsibility for milling machine sales; Alfred W. Sparrow was assigned the post of director of screw machine sales; Harold B. Schott was

A NEW CONCEPT!

MOHAWK

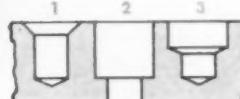
Size-Optional

SUBLAND

Believing that there is too great a void between standard and special tooling, Mohawk has designed and developed a semi-standard subland tool.

The Mohawk Size-Optional Subland is machined, hardened and placed in a stock bin. This results in a material saving to the customer in set-up costs, reduces delivery time to a fraction of that usually required for special tools, and allows a tremendous reduction in inventory. In ordering these Size-Optional Sublands, the customer is limited only in relation to shank specifications, and partially on overall length requirements. Diameters and step lengths are completely optional to fit the particular application. Write for full details.

NORMAL DELIVERY
1 WEEK
FROM RECEIPT OF ORDER



SUBLAND DRILL (2-2)
(1) Drill—Chamfer
(2) Drill—Counterbore
(3) Drill—Drill



910 E. MAIN ST., MONTPELIER, OHIO

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RELY ON B. JAHN PRODUCTION PROVED DIES TO KEEP QUALITY UP, OPERATING COSTS DOWN!

Manufacturers who supply millions of products — for millions of people — use progressive dies that produce with precision throughout long production runs. No chance of interrupted production, no costly breakdowns, no delays, no imperfections in die or finished piece — that's why the best known names in industry specify "B. Jahn Production Proved Dies."

B. Jahn dies are painstakingly engineered for performance! Above all, every B. Jahn die is "Production Proved" in actual operation. This means up to 50,000 pieces can be run and delivered for inspection or assembly line use before the tool is shipped — a production tool warranted to operate in the customer's equipment to his complete satisfaction.

Yours on request! The fact-filled "Story of B. Jahn Production Proved Dies."



THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-216

named director of industrial product sales; George A. Hawkins is now director of market research and sales promotion. James Meehan continues in his capacity as director of grinding machine sales.

distributors

Appointment of Allied Tool & Abrasive Co., 3314 Fruitland Ave., Los Angeles 58 as their distributors in southern California has been announced by the Gairing Tool Co. Allied Tool will maintain a stock of Gairing standard tools to serve that area.

✓ ✓ ✓

Announcement of Mitchell R. Olsen, who does business as The Olsen Co., 5341 Santa Monica Blvd., Los Angeles, as its dealer in Southern California, has been made by The Rotor Tool Co. The company will stock both tools and repair parts for delivery and service in that area.

✓ ✓ ✓

Viking Tool Co. has named Gierston Tool Supply Co., Elmira, N. Y., as an exclusive distributor in the Elmira, Binghamton, Jamestown and Scranton, Pa. area.

✓ ✓ ✓

American Sip Corp., distributors in the United States of SIP equipment, has announced appointment of Overgard Machine Tool Co., 2045 W. 8th Ave., Denver, Colo. as representative for all SIP standard products. Operating out of the Denver office, Carl M. Overgard, Ray Anderson and Arnold Schichler will serve Colorado and Utah. Mr. Overgard is a member of ASTE's Denver chapter.

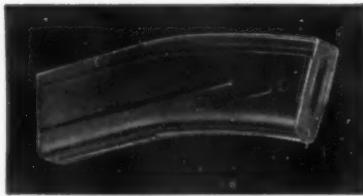
✓ ✓ ✓

Three announcements concerning distributors for their products have been released recently by Ampco Metal, Inc. St. Catharines Brass Works, Ltd., St. Catharines, Ontario, now distributes several Ampco stock products in the Canadian area. The Hays Supply Co. of Memphis, Tenn., was named distributor for Ampco centrifugal pumps. A third announcement released by the company's Resistance Welding Div. lists new distributors for the Ampco-Weld line. These include Brady Supply Corp., Elmira, N. Y.; C. D. Genter Co., Chattanooga, Tenn.; Keen Machinery Co., Cincinnati, Ohio; Walter Pestek, Cortland, Ohio; and Georgia Supply Co., Jacksonville, Fla.

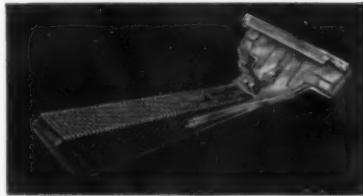
✓ ✓ ✓

D. G. Gibson has been made district manager of The Timken Roller Bearing Co.'s Dallas territory to succeed the late Harry Trump. Mr. Gibson was formerly assistant district manager.

The Tool Engineer



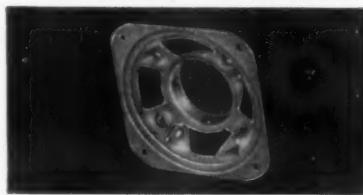
CARBINE MAGAZINE



EVERSHARP HYDRO-MAGIC RAZOR



CAR CIGARETTE LIGHTER PARTS



RADIO LOUDSPEAKER PART



RAZOR BLADE CASE

B. Jahn

Who's Meeting - and Where

Mar. 10-11. PORCELAIN ENAMEL INSTITUTE. Pacific coast conference, Biltmore Hotel, Los Angeles, Calif. Get details from institute offices, DuPont Circle Bldg., 1346 Connecticut Ave., N. W., Washington, D. C.

Mar. 14-15. STEEL FOUNDERS' SOCIETY OF AMERICA. Annual meeting, Drake Hotel, Chicago. For details write society headquarters, 920 Midland Bldg., Cleveland 15, Ohio.

Mar. 14-18. AMERICAN SOCIETY OF TOOL ENGINEER. 1955 Western Industrial Exposition, Shrine Auditorium and Exposition Hall, Los Angeles. Annual meeting to run concurrently, Ambassador Hotel and Shrine Auditorium. Complete information available from Society headquarters, 10700 Puritan Ave., Detroit 38, Mich.

Mar. 15-17. AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Power Division. Utilization of Aluminum conference, William Penn Hotel, Pittsburgh, Pa. Write to institute office, 36 W. 46th St., New York 36, N. Y. for more data.

Mar. 16-18. PRESSED METAL INSTITUTE. Annual spring technical meeting, Hotel Carter, Cleveland, Ohio. Request details from institute office, 2860 E. 130th St., Cleveland, Ohio.

Mar. 16-19. INDUSTRIAL DIAMOND ASSOCIATION OF AMERICA. Annual meeting, Hollywood Beech Hotel, Hollywood Beech, Florida. For details, contact association office, 124 E. 40th St., New York, N. Y.

Mar. 24-25. AMERICAN MACHINE TOOL DISTRIBUTORS ASSOCIATION. Spring meeting, The Greenbrier, White Sulphur Springs, W. Va. More information is available from association headquarters, 1900 Arch St., Philadelphia 3, Pa.

Mar. 28-Apr. 1. AMERICAN SOCIETY FOR METALS. Ninth Western Metal Exposition and Congress, with 19 technical societies cooperating, Pan Pacific Auditorium, Los Angeles, Calif. Full par-

"Sealed-in Lubrication"

Pat. Pend.



Cut-a-way shows oil reservoir in lubrication pistons.

Wick, inserted in groove between U-cups, supplies a constant film of oil to the full inside cylinder wall. Radial holes, drilled through from the groove to the reservoir, supply oil to the wick by capillary action. This assures low break-away action even if cylinder has been long idle.

Sealed-in oil is ample for thousands of cycles without attention.

It's another LEHIGH quality exclusive. See catalog for many additional features.

Lehigh HEAVY DUTY AIR MOTORS

For converting any foot or hand operation on tools, processing or handling equipment to semi or completely automatic operation.

Combines a LEHIGH Double-Acting, Self-Lubricating Cylinder with a LEHIGH 4-way Air Powered Valve and a wide choice of electric and/or air controls and mountings.

For air pressures up to 200 P.S.I. Standard bores: 1½" - 2" - 3". Any desired stroke. Larger bores on special order.

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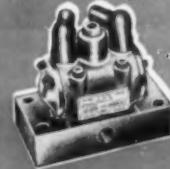
SELF-LUBRICATING AIR CYLINDERS

Standard bores 1½" to 8". Exceptionally compact mounting dimensions.



3 or 4-way AIR POWERED VALVES

Made to J.I.C. standards. Wide range of models — air or electrically controlled.



Lehigh Minor AIR VALVES & CYLINDERS

Low priced cylinders and valves for light duty operation. Ideal for air operated rigs and fixtures and for high speed operations.



COMBINATION VALVES

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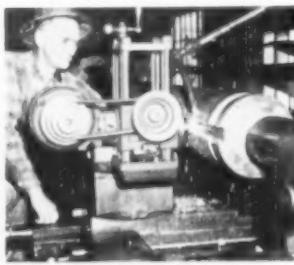


ELECTRIC FOUNDRY PRODUCTS, PROFILE TRACING LATHE ATTACHMENTS, COMMERCIAL REFRIGERATION SYSTEMS, AUTOMATIC VENDING MACHINES.

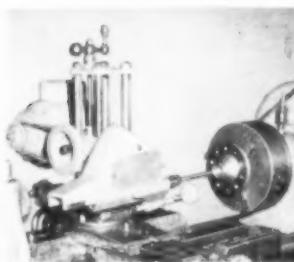
FOR FURTHER INFORMATION, USE READER SERVICE CARD: INDICATE A-3-217



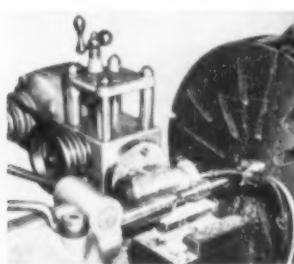
MASTER MACHINE TOOL ATTACHMENTS



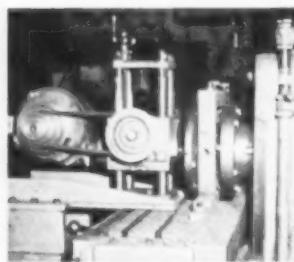
End Milling 2½" Keyway in 97/8" Diameter shaft 22-ft. Long



Master Slitting Head on Lathe
Cutting Internal Taper Keyway



Thread Milling on a Lathe
Internal or External



Master Lathe Converter as
Duplex Head on a Mill

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, thread milling, boring, drilling, indexing, slitting, and keyseating, internal and external. Performs all operations for maintenance, tool room, and production at a minimum investment.

MASTER LATHE CONVERTER

is available in four sizes:
Model "C" ½ H. P. — 9" to 13" Lathes
Model "B" ½ or ¾ H. P. — 13" to 18" Lathes

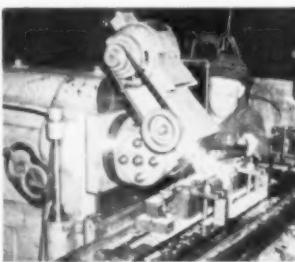
Model "M" 1 to 3 H. P. — 18" to 72" Lathes
Model "H" 5 H. P. — 24" and Larger Lathes

THE REVOLUTIONARY NEW TURRET-MASTER is a small, compact, powered tool head for turret lathes, which powers the tool for either *on* or *off* center milling, drilling or boring, can be assembled for horizontal or vertical spindles. ½ to 3 H. P.

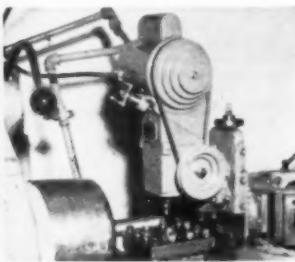
THE GEARED VERTICAL MILL HEAD amplifies operations of horizontal milling machines by combining independent power and double compounded swivel for angular positioning with capacities from ¼ H. P. to 5 H. P.

Outstanding advantages of these modern, easy-to-operate, supplementary tools are: (1) comparative low cost; (2) Greater number of operations can be performed in one set-up, without resetting on another machine; (3) Can be used singularly, in a series, or grouped on basic lathes, milling machines, planers, or special fixtures; (4) Work can be either fed into the heads or the heads into the work; (5) All types of feeding mechanisms can be adapted for hand feeding, mechanically, hydraulically, or by air; (6) Convenience of a tool; strength and capacity of a machine; (7) Independently powered—twenty-four milling spindle speeds.

For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries!



Geared Vertical Mill Head
on a Horizontal Mill



Turret-Master End Milling
Keyway on a Turret Lathe

ticulars available from society offices, 7301 Euclid Ave., Cleveland, Ohio.

Mar. 29-Apr. 7. AMERICAN CHEMICAL SOCIETY. Spring meeting, Cincinnati, Ohio. Details may be had from society offices, 1155 Sixteenth St., N.W., Washington 6, D.C.

Mar. 30-Apr. 1. AMERICAN POWER CONFERENCE, sponsored by Illinois Institute of Technology in cooperation with 14 universities and 9 engineering societies. Will include 30 sessions covering most phases of the power industry. For complete information write to the Institute, 35 W. 33rd St., Technology Center, Chicago 16, Ill.

Apr. 5-7. NATIONAL FLUID POWER ASSOCIATION. Annual spring meeting, Colorado Springs, Colo. Get complete details from association office, 1618 Orrington Ave., Evanston, Ill.

Apr. 6-10. WORLD PLASTICS FAIR AND TRADE EXPOSITION, INC., National Guard Armory, Los Angeles. Get complete information from executive office, 8762 Holloway Dr., Los Angeles 46, Calif.

Apr. 13-15. AMERICAN SOCIETY OF LUBRICATION ENGINEERS. 10th Annual meeting, Hotel Sherman, Chicago, Ill. Address requests for more details to society headquarters, 84 E. Randolph St., Chicago 1, Ill.

Apr. 13-15. SOCIETY OF THE PLASTICS INDUSTRY, INC. Pacific Coast section conference, Palm Springs, Calif. Direct inquiries to society offices, 67 W. 44th St., New York 36, N.Y.

Apr. 16-17. PACKAGING MACHINERY MANUFACTURERS INSTITUTE. Semiannual meeting, Palmer House, Chicago, Ill. For more facts, write institute offices, 342 Madison Ave., New York 17, N.Y.

Apr. 18-20. AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Spring meeting, Baltimore, Md. More information may be obtained from society headquarters, 20 W. 39th St., New York 18, N.Y.

May 2-13. BRITISH INDUSTRIES FAIR, London and Birmingham, England. Heavy industry will center at Castle Bromwich, Birmingham. Get more information from British Information Services, 30 Rockefeller Plaza, New York 20, N.Y.

May 7-15. THE SOCIETY OF THE PLASTICS INDUSTRY, INC. Annual meeting and conference to be held during cruise on Queen of Bermuda. More information may be obtained from society office, 67 W. 44th St., New York 36, N.Y.



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May 10-12. METAL POWDER ASSOCIATION. Metal Powder Show and annual meeting, Bellevue-Strafford Hotel, Philadelphia, Pa. Write for more details to society headquarters, 420 Lexington Ave., New York 17, N. Y.

May 16-20. AMERICAN MATERIAL HANDLING SOCIETY. National Materials Handling Exposition, International Amphitheatre, Chicago, Ill. Complete information is available from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

May 18-20. PORCELAIN ENAMEL INSTITUTE. Mid-year division conference, Edgewater Beach Hotel, Chicago, Ill. Contact institute headquarters, Dupont Circle Bldg., 1346 Connecticut Ave., N. W., Washington, D. C., for details.

May 31-June 3. DESIGN ENGINEERING SHOW. First exposition and technical conference, instituted as successor to Basic Materials Exposition, devoted to problems of design engineers, Convention Hall, Philadelphia, Pa. More facts available from exposition managers, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

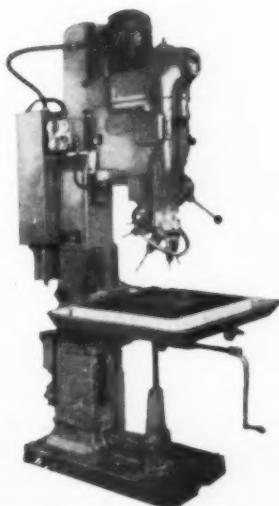
June 8-10. AMERICAN WELDING SOCIETY. Annual welding show, Municipal Auditorium, Kansas City, Mo. Spring technical meeting of the society to run concurrently June 7-10. For details contact society's management office, Suite 1006, 12 E. 41st St., New York, N. Y.

June 20-23. AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Semi-annual meeting, Statler Hotel, Boston, Mass. For particulars contact society headquarters, 29 W. 39th St., New York, N. Y.

June 20-24. AMERICAN SOCIETY FOR ENGINEERING EDUCATION. 63rd annual meeting, Hetzel Union Bldg., Pennsylvania State College, State College, Pa. Direct inquiries to Prof. K. L. Holderman, General Chairman, 103 Mechanical Engineering Bldg., Pennsylvania State College.

June 26-July 1. AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Chalfonte, Haddon Hall, Atlantic City, N.J. For more information, write society office, 1916 Race St., Philadelphia 3, Pa.

July 12-14. WESTERN PLANT MAINTENANCE SHOW, to run concurrently with Western Plant Maintenance and Engineering Conference, Pan Pacific Auditorium, Los Angeles, Calif. For full particulars, write show producers, Clapp & Poliak, Inc., 759 Monadnock Bldg., San Francisco 5, Calif.



ways to cut costs of drilling and tapping

The H&F turret drilling machine, with preset depths, speeds and reversals—all attention-free during successive operating cycles—offers dramatic savings in:

- 1. Handling time.
- 2. Set-up time.
- 3. Tooling.
- 4. Maintenance.
- 5. Capital investment.
- 6. Floor space.

H&F Time Study #10 proves this versatile machine cuts handling time from 24% to 67%, assuming conditions most favorable to competitive equipment.

Write for H&F Time Study #10 and new bulletins.

H&F's time saving turret attachment is separately available for attachment to standard drill presses . . . preset depth, speeds and reversals not included.

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Men at Work . . .

Recent election held by the board of directors of Raybestos-Manhattan, Inc. made **S. R. Zimmerman, Jr.** vice-president of the company. He is presently a director and assistant general manager of the U. S. Asbestos—Grey-Rock Div. During the same election, **R. J. Gorecki**, who is factory manager of the Manhattan Rubber Div. was elected a director; and H. H. Burrows, sales manager of the Industrial Rubber Products Div., was elected vice-president—rubber sales.

William M. Bausch is new president of Mill Strip Products Co., and at the same time assumed the vice-presidency of Korhumel Steel & Aluminum Co., parent company of the Mill Strip firm. Until recently, Mr. Bausch was vice-president, sales, of Follansbee Steel Corp.

George E. Bowdoin, formerly president of U. S. Hoffman Machinery Corp., has joined Worthington Corp. as assistant to the president. Mr. Bowdoin had been associated with U. S. Hoffman in various capacities for 24 years.

New president of the Toledo Porcelain Enamel Products Co., wholly-owned subsidiary of the Bettinger Corp., is **Sylvan F. Chappuis**. He has been associated with the company since its founding in 1928.



Left. Franklin E. Lowance has joined Westinghouse Air Brake Co. to fill the new post of director of research and engineering.

Right. Thomas W. Johnson is now director of engineering at New York Air Brake Co. in charge of the firm's five divisions.



John J. Murray and **Richard Doughton, Jr.** have been made development engineers in the Product Development Div. of Jones & Laughlin Steel Corp. Mr. Murray was previously supervising engineer in the design engineering department, while Mr. Doughton has been staff metallurgist for the Materials Advisory Board of the National Academy of Sciences.

Two appointments made by Carboloy Department of General Electric Co. included **Ernest E. George**, who was made plant manager of the department's permanent magnet plant in Edmore, Mich., and **R. J. Studders** who was named to succeed Mr. George as manager of magnetic products engineering. Mr. Studders previously was magnet development engineer.

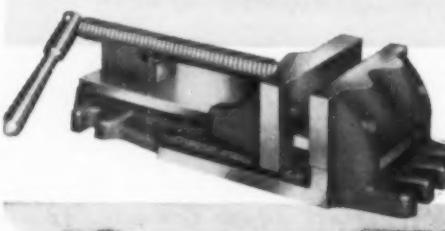
Appointment of **Jesse A. Giles** to the post of manager of its Toronto plant has been announced by A. Schrader's Son, Div. of Scovill Mfg. Co., Inc. Mr. Giles, who has been with the firm since 1930, has been superintendent of the Canadian plant.

At the same time, the company announced appointment of **Donald H. Storey** as assistant manager of the Schrader Tire Valve Manufacturing Plant in Toronto. He had been sales manager since 1951.

Here's PROOF that
~~SPEED VISE~~
is a fast
production tool

Here's a production set-up on a multiple spindle semi-automatic drilling machine that is really cutting manufacturing time and costs. The use of two Speed Vises eliminates the need for expensive and complicated fixtures and at the same time increases the production range. With Speed Vise it is only necessary to make a simple jaw plate to fit the parts being machined and to hold drill bushings, etc.

- ★ Quick action design for speed. Opens instantly to full capacity to handle work of any size.
- ★ Standardized holes for attaching jigs or jaw plates.
- ★ Lift...slide...lock...that's all there is to the fast, positive locking action.
- ★ Heavy, semi-steel castings for extra strength and a heavy base plate for rigidity.



Write now for Bulletin 30-AM

**CARDINAL
MACHINE COMPANY**

1819 Dana Street, Glendale, California



Philip F. Thayer is now vice-president of General Metals Corp. and general manager of its Metals Div. He formerly was the general manager of Willamette Iron & Steel.



George E. Merryweather has been elected chairman of the board and secretary of The Motch and Merryweather Machinery Co. He also will serve as chairman of the executive committee.



Floran L. Meacham has been elected president and general manager of The Simonds Worden White Co. He was previously associated with Avco Mfg. Co. as general works manager.



E. V. Dowden has been named a vice president of Osborn Manufacturing Co. He also will continue as manager of the company's Brush Div., a post he has held since 1952.

In addition to electing George Merryweather board chairman and secretary, the board of directors of The Motch and Merryweather Machinery Co. elected Charles B. Lansing to the office of president of the company, and Clare R. Kubik to the position of executive vice-president and treasurer. Mr. Lansing, who succeeds the late E. Franklin Motch, has served as president of both the National Tile Co. and The Ilco Ordnance Co. Mr. Kubik, who was elected a director in addition to the other offices, is a member of ASTE's Cleveland chapter.

Frank M. Cashin, manager of the Chemicals Div., has been appointed a vice-president of Kaiser Aluminum & Chemical Corp. by the board of directors at its recent quarterly meeting.

Announcement of the appointments of R. E. Kroeck and B. A. Robbins to the positions of manager of manufacturing and manager of engineering respectively has been made by Enterprise Div. of General Metals Corp. Prior to these assignments, Mr. Kroeck was manager of production control and purchasing, and Mr. Robbins was chief products development engineer.

In connection with the reorganization of its engineering division, Consolidated Engineers Corp. has named Armand F. DuFresne to fill the newly-created post of chief product engineer. In this capacity, he will be responsible for translating newly developed instruments into design form for manufacture and use.

Frederick B. Porteous has been appointed manager of the recently completed can machinery plant for E. W. Bliss Co. at Hastings, Mich. Mr. Porteous formerly was chief engineer of the Hastings Div.

GRINDING TIME CUT 50%

**New Rotor D-4S Air Grinder
pays for itself in 12 weeks**



Job: Grinding defects in holes of castings with cone wheel (size 2 3/4" x 3 1/2" x 5/8"). Formerly used 3600 rpm electric grinder (3 phase, 220v.). Job took 8 minutes—too slow.

Solution: Rotor Application Engineer suggested changing to Rotor D-4S Cone Grinder—speed 8500 rpm.

Results: Saves 4 minutes per casting; doubles output. With 50% use factor, savings paid for new Rotor Grinder in 12 weeks. Wheels last longer. Tool is lighter (only 8 1/4 lbs.); easier to handle. No tool stalling—even when crowded in hole.

Get the Rotor Engineer on your portable tool jobs to save you money!



APPLICATION

Rotor D-4 Air Grinders are available with straight or grip handle at 8500 rpm for cone wheels and 4" elastic wheels and at 6000 rpm for cone wheels, 6" elastic wheels and 4" vitrified wheels.

ASK FOR BULLETIN 43

THE ROTOR TOOL CO.
CLEVELAND, OHIO

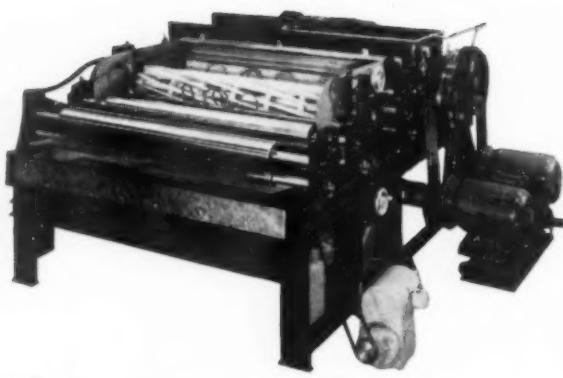
UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

HIGH CYCLE
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a FULLER BRUSH product

A Brushing Machine



'YES'

we've solved
production problems for mirror, laminated
plastic, strip metal, paper processing, litho-
graphing and automotive industries.

Maybe we can solve yours too!

Outline your problem and we'll work out an
answer for you. Simply send your letter to . . .

Machine Division
THE FULLER BRUSH CO.
3663 MAIN ST., HARTFORD 15, CONN.

a FULLER BRUSH product

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At the annual directors meeting, stockholders of the Harig Mfg. Corp., elected **Karl Harig**, former president of the firm, to the position of chairman of the board. Other executive changes made **Herbert Harig** president and treasurer; **Theodore Eckert**, vice-president of manufacturing and secretary, and **William Thorp** vice-president of sales.

A. G. Hoffer has been made works manager of Gisholt Machine Co. Mr. Hoffer, who is a member of ASTE's Madison chapter, was previously general plant superintendent.

Scovill Mfg. Co. has revealed appointment of **Arthur P. Hickcox**, vice-president, to general manager of the firm's main plant operations located in Waterbury, Conn. Mr. Hickcox has been associated with Scovill since 1910. Succeeding him in his former capacity as director of purchasing is **Lewis F. Cobb** who has been assistant director.

Two men recently advanced by The Cleveland Crane & Engineering Co. were **Harry Cotesworth** who was made chief engineer of the development department, and **Kurt R. Weise** who became chief engineer of the Cleveland Tramrail Div. Mr. Cotesworth and Mr. Weise both have long and well-known backgrounds with the firm, having served there for 25 and 31 years respectively.

Carl George Arthur Rosen, consulting engineer to the president of Caterpillar Tractor Co., has been inaugurated president of the Society of Automotive Engineers for this year. Vice-presidents who took office at the same time include: Air Transport, **R. Dixon Speas**, aviation consultant at La Guardia Field; Aircraft, **James D. Redding**, Aviation Gas Turbine Div., Westinghouse Electric Corp.; Aircraft Powerplant, **F. E. Carroll, Jr.**, United Aircraft Products, Inc.; Body, **H. S. Kaiser**, Pontiac Motor Div., General Motors Corp.; Diesel Engines, **Fred A. Robbins**, Koppers Co. Inc.; Engineering Materials, **W. Paul Eddy, Jr.**, Pratt & Whitney Aircraft Div., United Aircraft Corp.; Fuels and Lubricants, **John F. Kunc, Jr.**, Research Div. of Esso Laboratories, Standard Oil Development Co.; Passenger Car, **Robert F. Kohr**, Ford Motor Co., Production, **Paul A. Miller**, Parts and Equipment Div., Ford Motor Co.; Tractor and Farm Machinery, **Trevor Davidson**, Bucyrus-Erie Co.; Transportation and Maintenance, **Robert Gardner**, American Trucking Associations, Inc.; Truck and Bus, **R. C. Norrie**, Kenworth Motor Truck Corp.

Technical Shorts...

SIMPLE MEANS of safely controlling operation of electrical machinery has been reported by Harris-Seybold Co., printing equipment manufacturers, who have developed the invention jointly with Cutler-Hammer, Inc. The idea from which the control was developed is simple. It merely requires

that the operator push two buttons simultaneously with two fingers of the same hand in order to start the machine to operate continuously. Pushing either of the buttons singly keeps the machine in operation only during the time the button is depressed. This permits the operator to inch or start and stop equipment rapidly when making adjustments without danger of starting it on a continuous run.

The development was intended initially for use on printing equipment, however, it is expected to find a broad application to other types of machinery that must be started and stopped intermittently. It already has attracted interest from both the National Safety Council and the Engineering and Research Council.

Although Harris-Seybold has filed patent application on the device, because of the nature of the invention, the company is offering it to the public so that it may be manufactured or used without royalty payment.

Safety Control for Electrical Machinery

titanium grows out of that metal's resistance to certain types of corrosion. As a consequence, a broad field is now expected to be opened for the use of castings of titanium. Initially, use could be anticipated for such items as sealing rings, bushings, fittings etc. in areas where salt water corrosion is a problem.

Difficulty of melting and pouring titanium previously has defeated attempts to use the metal for castings. According to the researchers, liquified

titanium will attack nearly any other material which means that the casting has a rough surface and will contain impurities from absorbing gases from such materials.

* * *

A PUMP that operates successfully to move liquid metals within cooling or heating systems has been developed by Callery Chemical Co. and reported by the *Industrial Research Newsletter* published by Armour Research Foundation.

**Electromagnetism
Is Utilized
To Pump Metal**

pump operates on an electromagnetic principle. An electric current flowing in a direction perpendicular to a magnetic field which surrounds the metal is conducted



multiple mills speed production, save set-up time!



When you get 5 milling machines for the usual price of 2 or 3 . . . set up "production line milling" that's easily adapted to an extremely wide range of parts . . . you also get important savings! So reports an aircraft parts plant that installed 5 GREAVES MILLS, saved capital investment, production and set-up time!

With extra-size tables, 60" x 12" having 34" travel, GREAVES MILLS can be set up for fast, precise machining of larger parts requiring longer travel. Attachments include: dividing heads, vertical and universal milling, rack cutting, slotting, rotary table and others.

Write for Price and Performance Comparison Chart

GREAVES MACHINE TOOL CO.

2303 EASTERN AVE., CINCINNATI 2, OHIO

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FIRST SUCCESSFUL true centrifugal casting of titanium has been produced following metallurgical studies carried on at the Armour Research Foundation of Illinois Institute of Technology. Now several castings weighing from 3.3 to 9 lb have been produced. Casting equipment

Castings of Titanium

and techniques were designed or supervised by Wisconsin Centrifugal Foundry, Inc., under whose sponsorship the research had been carried on. By the method which has been achieved, there is no contamination from furnace or mold materials during melting of the titanium—a major advantage of the process.

One of the important results of the development of centrifugal castings of



NILSON 4-SLIDE TAKES A TOUGH ONE . . .

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.



THIS ONE WAS EASY . . .

A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons.

A. H. Nilson provides forming recommendations from detailed information without obligation. Send for catalog.



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MACHINE COMPANY

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Automatic Chain Making Machines : Staple Forming Machines : Wire and Stock Reels : Wire Straightening Equipment : Slide Feeds for Presses
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through the metal to be moved. A force is thus produced that sets the metal flowing within the pumping section.

Another similar job that could be accomplished by this electromagnetic pump setup would be the forcing of liquid into forms in die casting operations.

* * *

MODERN PROCESSES involved in metal forming as they are used to produce aircraft, jet engine and guided missile and helicopter parts are presented in a color movie "Precision Metal Forming" which has been released by The Cyril Bath Co.

The film traces development of a radial draw former and shows how the latest model of this equipment forms a part against the die. Presents particularly such details as production of rings, arcs, sweeping curves angle changing and multi-plane parts in stainless steels, high tensile aluminums and other modern metals. It also demonstrates formation of joggles, reverse bends and large sheet parts. Finally, the picture shows some of the giant metal forming machines not yet in use.

Required showing time for the film is 31 minutes.

* * *

COMMONLY ACCEPTED techniques used in shaping metals are re-examined in the recently released film "Production Band Machining" made by The DoAll Co. The 16-mm sound picture stresses

a different concept for rapid machining in production of duplicate parts by removal of metal in

sections rather than reducing it to chips. This concept utilizes a contour cutting band machine equipped with a powered worktable plus simple fixtures. Band machining principles, the film explains, are the method of removing unwanted material in whole salvageable sections by machining directly to the outline of a part. The DoAll film suggests its use as a time-saving procedure since constant downward pressure caused by the cutting tool avoids work fixturing.

The film compares this band machining method to present orthodox metalworking and in various scenes it shows closeups of details of cutting to point out advantages and special features.

The film, which has a running time of 30 minutes, is available on a free-loan basis from DoAll in Des Plaines, Ill.

Trade Literature

For Free Booklets and Catalogs—
Convenient Request Card on Page 231

Blast Cleaning

Bulletin No. 227 describes type RG Rotoblast unit used in company's blast cleaning machines; discusses principle of design, operation, advantages given to equipment because of its use; includes line drawings and cut-away views to show construction features. Pangborn Corp., Hagerstown, Md.

L-3-1

Hand Trucks

Four-page illustrated folder presents Zephyr hand lift truck, lightweight unit designed for carrying loads up to 1000 lb.; describes special features and advantages; includes specifications for various models. The Yale & Towne Mfg. Co., Philadelphia 15, Pa. L-3-2

Indicator Holders

Magnetic base indicator holders, called Magna-Holders, described and illustrated in 8-page folder, catalog 755, which also shows various attachments for the tool. Includes photos to show tool in use. Cullen Mfg. Co., Racine, Wis. L-3-3

Cemented Carbide

Illustrated 20-page catalog No. 1 presents company's complete line of Firlomet cemented carbide blanks; includes prices and terms. Also illustrates company's modern plant, production and laboratory equipment for producing carbide metals; includes grade selection chart. Firth-Loach Metals Inc., Buttermilk Hollow Rd., McKeesport, Pa. L-3-4

Metal Finishing

"Abrasive Grain and Powders" presents informative charts and illustrations plus latest engineering recommendations covering abrasives for use in metal finishing. Deals with such subjects as their properties, elements of metal polishing, preparation and care of polishing wheels. The Carborundum Co., Niagara Falls, N. Y. L-3-5

Broaching

Four-page folder RS-54 describes expanded line of single-ram surface broaching machines; blueprint type drawing shows all three views of typical unit; dimensions and specifications tabulated. Colonial Broach Co., Detroit 13, Mich. L-3-6

Cylinders

Catalog 101 covers line of low pressure cylinders, 650 psi maximum; first of series of catalogs each of which will cover part of various line of air or hydraulic cylinders and valves; All of series designed to fit into single binder as a set. Nopak Div., Galland-Henning Mfg. Co., 2753 S. 31st St., Milwaukee 46, Wis.

L-3-7

Hobbing

Eight-page bulletin LH-54 covers details of model 1445 ultra-speed gear hobber, emphasizing universal features, important points of machine design and construction details; simple diagrams show operating details; also discusses hobber's adaptability to automation. Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. L-3-8

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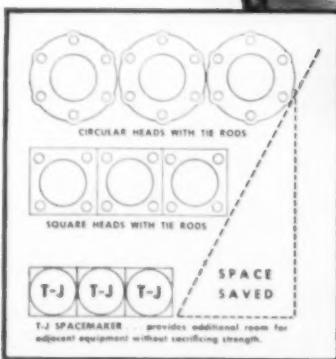
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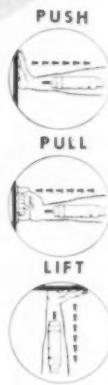
226

Chuck Jaws

Line of soft blank top jaws presented in folder SJ-67; includes specifications and prices. The Skinner Chuck Co., New Britain, Conn. L-3-9

Switches

Twelve-page catalog No. 75 covers subminiature snap-action precision switches, auxiliary actuators, toggle and pushbutton subminiature switch assemblies; discusses characteristics, construction, operation and applications. Illustrated. Micro Switch, Div. Minneapolis-Honeywell Regulator Co., Freeport, Ill. L-3-10



Arbors

Complete line of milling cutter arbors described in illustrated brochure; dimensional drawings and tables included. Lovejoy Tool Co., Inc., Springfield, Vt. L-3-11

Solenoids

Bulletin GEA-6215 describes and illustrates new line of strongbox industrial solenoids; gives details on products features, laboratory tests and general application rules; cross-reference chart equates new line with corresponding models in former line, shows proper model for use for given requirements of force and stroke. Charts show force and current curves for both push-and-pull types. General Electric Co., Schenectady 5, N. Y. L-3-12

Automated Equipment

"Sectionized Automation by Cross" introduces company's development based on division of a machine into sections any one of which can be shut down while the others remain in automatic operation; extensively illustrated to show equipment in action. The Cross Co., Detroit 7, Mich. L-3-13

Drafting Equipment

Extensively illustrated catalog 8-A describes line of drafting furniture and equipment useful to engineering and drafting rooms; includes shipping information. Request on company letterhead directly from Mayline Co., Inc., 619 N. Commerce, Sheboygan, Wis.

Special Fixtures

Illustrated bulletin gives details about two recently introduced products: the compression fixture and setting gage designed to speed the setting of recessing tools; and the micrometer grinding fixture to give a quick, sure method for sharpening circular form cutters and provides accurate grooving operations. Includes specifications and prices. Scully-Jones and Co., 1901 S. Rockwell, Chicago, Ill. L-3-14

The Tool Engineer

Grinding and Polishing

Literature on techniques of grinding and polishing with coated abrasives presented in 60-page manual "Production Digest" of technical papers during the past two years on the various phases of the subject by specialists in the field. Extensively illustrated both with photos and drawings. Behr-Manning Corp., Dept. PD-54, Troy, N. Y. **L-3-15**

Thread Rolling

Bulletin G-96-1 deals with company's thread rolling attachments for use with either an automatic screw machine or lathes; covers construction, design features, uses and advantages; includes specifications and dimensions; illustrated. Landis Machine Co., Waynesboro, Pa. **L-3-16**

Metal Shaping

Folder introduces Metal Worker, a single tool for use as bender, bar shear or angle shear for steel, aluminum, copper, brass and bronze, outlining advantages and applications. Wielands Inc., 18 Locust Lane, Pittsburgh 28, Pa. **L-3-17**

Shelving

Main features of and advantages of adjustable steel shelving explained in illustrated folder stressing ease of assembly and variety of combinations possible. Standard Pressed Steel Co., Box 786, Jenkintown, Pa. **L-3-18**

Copper

Easy-to-use 24-page reference manual, Anaconda Publication B-34R, "Copper and Copper-Alloy Specifications Index", covers ASTM, ASME, AWS, SAE, AMS, Federal, military, Army, Navy and Joint Army-Navy specifications for copper and its alloys; divided into two sections—first lists most generally used alloys with applicable specifications of the agencies; second lists specifications in numeric order with brief descriptions of material as to alloy, grade, type, temper, anneal, etc. The American Brass Co., Waterbury 20, Conn. **L-3-19**

Cemented Carbides

Illustrated 24-page pocket-size manual, section 3A "Selection of Carboloy Grades and Suggested Speeds" offers data for determining efficient cutting speeds for machining steel, cast iron and nonferrous materials, calculating machine horsepower, determining carbide grades by characteristics selecting rake and relief angles of tools; reference table help in selecting speed and grade for cutting various materials. Carboloy Dept., General Electric Co., Detroit 32, Mich. **L-3-20**

WHAT'S THE
BEST WAY TO STRIP
METAL PARTS
IN LARGE VOLUME?

See page 9



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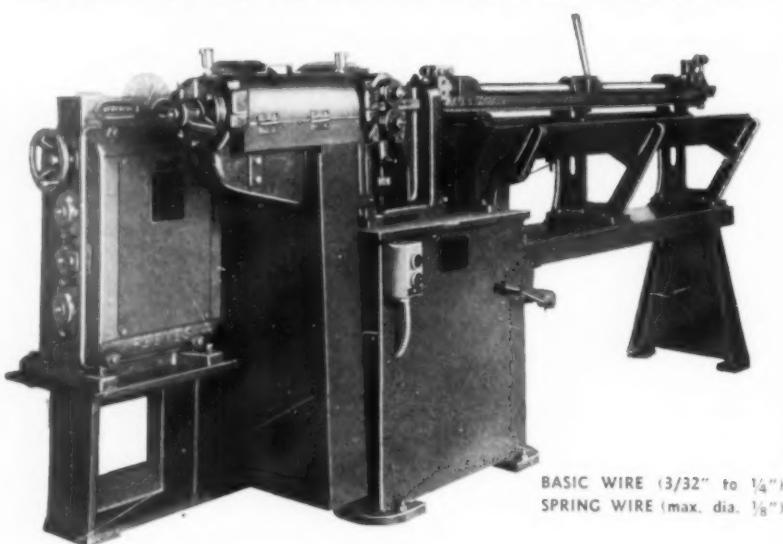
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Titanium Tubing

Bulletin 43, "Titanium, New Member of the Family of Metals" presents latest information on tubing of this metal; discusses physical and chemical properties; covers fabrication, heat treating, pickling, welding, brazing and machining. Superior Tube Co., 1132 Germantown Pike, Norristown, Pa. L-3-21

Worm Gears

Engineering Manual SW No. 1 covers company's line of standard worm gear sets; outlines design suggestions for users as well as tips on how to select worm gear sets; includes tables of specifications and dimensions plus engineering drawings of various models. Foote Bros. Gear and Machine Corp., 4545 S. Western Blvd., Chicago 9, Ill. L-3-22

Index Tables

Company's Intermittor, standard precision index tables for high-speed production, described in 12-page catalog No. 300; includes assembly drawings, tables of load ratings and dimensions of more than 150 models plus data on indexing mechanism. Ferguson Machine & Tool Co., Roller Gear Div., P. O. Box 191, St. Louis 21, Mo. L-3-23

Cleaning, Finishing

Comprehensive 18-page brochure 541-D deals with wet abrasive blasting process; covers 40 typical applications where the process can be used pointing out advantages in each case; illustrated. American Wheelabrator & Equipment Corp., 1152 S. Byrkit St., Mishawaka, Ind. L-3-24

Brazing

Folder No. 67 of Low-Temperature Brazing News discusses brazing and points out advantages showing applications and equipment at work; widely illustrated. Handy & Harman, 82 Fulton St., New York 38, N. Y. L-3-25

Belt Drives

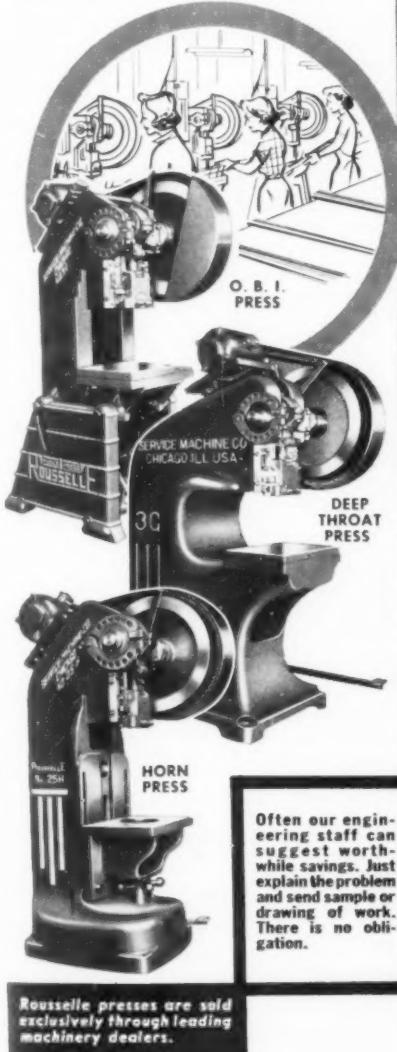
Illustrated 100-page manual V-1400-E2F on Multi-V-Drives offers scientific and simplified method for rating V belts; table on drive selections contains many stock-sheave combinations plus giving arc and length correction factors peculiar to each belt; a graph simplifies finding effective diameters for sheave diameter and ratio; gives service factors for proper duty classification based on load requirements and hours of service; also gives complete information on products and complete range of stock size sheaves with bore limitations. Worthington Corp., Mechanical Power Transmission Div., Oil City, Pa. L-3-26

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INDICATE A-3-229-1

March 1955

Gear Cutting

Two illustrated brochures deal with "Automatic Spur Gear Cutters" and "Automatic Gear Hobbers." Each discusses construction, design, operation and special features of equipment emphasizing speed, dependability and economy; include specifications for various models. Potter & Johnston Co., subsidiary of Pratt & Whitney, Pawtucket, R. I.

L-3-27

Grinding Wheels

Leaflet offers information on Grind-away reinforced resinoid wheels for high-speed portable grinding, stressing safety element; cutaway drawings explain construction; includes price lists. Colonial Abrasive Products Co., 6th and Harry Sts., Conshohocken, Pa. L-3-28

Stainless Steel and Alloy Tubing

Forty-eight-page booklet, "Trentweld Stainless and High Alloy Tubing," company's subsidiary, Trent Tube Co., includes practical guide to selection of tubing best suited to specific application; lists nine basic classifications of tubing, with typical applications, characteristics, and related data. Table outlines physical, chemical and electrical properties of tubing. Also gives pertinent information on welding, bending and installation techniques. Adv. Dept., Crucible Steel Co. of America, Henry W. Oliver Bldg., Pittsburgh 22, Pa.

L-3-29

Gaging

Illustrated 4-page brochure, "Automatic Gaging and Size Control," describes air-electric CompAIRators, explaining uses and advantages. The Taft-Peirce Mfg. Co., Woonsocket, R. I. L-3-30

Silicones

1955 Reference Guide lists silicone products divided according to 21 application classifications; contains tables, graphs and photos; gives comparable data on various silicone products and organic materials they displace; concise description of each product. Dow Corning Corp., Midland, Mich. L-3-31

Barrel Finishing

Two booklets describe barrel finishing techniques and products: "Barrel Finishing" explains process, operations performed and applications; "Abrasive Chips and Compounds for Barrel Finishing" in detail differences between types of finishing chips, giving specifications for 11 Honite compounds available for cutting, finishing and cleansing operations. Minnesota Mining & Mfg. Co., Dept. A-1632, 900 Fauquier St., St. Paul 6, Minn.

L-3-32

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Gear Drives

Catalog No. 105 deals with company's roller gear drives for high speed precision indexing of automatic production machinery; tables show load ratings, dimensions for components only and housed units; also gives data and instructions for load calculation, designing and installation and selection of drive. Ferguson Machine & Tool Co., Roller Gear Div., P. O. Box 191, St. Louis 21, Mo.

T-3-33

Chip Handling

Automatic handling of metal chips through conveyor system discussed in 8-page illustrated brochure; describes actual installations; explains savings possible through use of system. National Conveyors Co., Inc., 25 Industrial Ave., Fairview, N. J.

T-3-34

Milling, Grinding

Illustrated brochure presents details about electronic template and cam machine made by The New England Machine and Tool Co. for milling or grinding external and internal contours. Describes what the unit is, how it operates, its features and advantages; includes specification table. Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn.

T-3-35

Press

Widely illustrated 24-page catalog 120-C offers details about Denison hydraulic Multipress, emphasizing the variety of manufacturing problems on which it can be used; describes special features of the unit and accessories available, plus information about its operation. The Denison Engineering Co., Columbus 16, Ohio.

T-3-36

Watchmakers' Tools

Catalog M describes and illustrates broad line of precision lathes, micro-drill presses, micro drills and other tools and accessories for small precision work; includes dimension tables and price lists; indexed for quick reference. Louis Leven & Son, Inc., 3610 S. Broadway, Los Angeles 7, Calif.

L-3-37

Socket Screws

Two bulletins outline features, manufacturing methods and applications of full line of socket screws; include tables of sizes, dimensions and tolerances of American Standards for Screw Threads plus engineering data and application information for each type of screw; illustrated. Bulletin 898 covers hex type socket screws; bulletin 899 covers multiple spline socket screws. The Bristol Co., Waterbury 20, Conn.

L-3-38

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TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

Literature Number	COMPANY	DESCRIPTION
A-3-249	F. E. Anderson Oil Co., Inc.	Coolants—Leaflet "Case Histories of Lusol at Work" are available on request. (Page 248-249)
A-3-234	Barnes Drill Co.	Coolant Separators—Catalog 300G describes magnetic coolant separators. (Page 234)
A-3-67	Bay State Abrasive Products Co.	Grinding Wheels—Over 150 tool-conditioning specifications are given in "Wheels of Progress". (Page 66-67)
A-3-15	The Bellows Co.	Drilling and Tapping Units—Booklet shows how and where units can be used to best advantage. (Page 14-15)
A-3-44	Carboloy Department of General Electric Co.	Carbides—Brief-a-log GT-305 contains price list and specifications on Grades 350 and 370. Brief-a-log GT-285 contains price list and specifications on standard grades. (Page 41-42-43-44)
A-3-68	Clearing Machine Corp.	Presses—Catalog O.B.I. discusses Clearing presses. (Page 68)
A-3-290	The Cleveland Crane & Engineering Co.	Shears—Illustrated catalog 2011 gives construction and engineering details of steelweld shears. (Page 290)
A-3-385	Crane Packing Co.	Lappers—Data on the Lapwell and information on measuring flatness are available on request. (Page 385)
A-3-366-2	The du Mont Corp.	Broaches—Catalog describes Minute Man Keyway broach kit. Price list C is available upon request. (Page 366)
A-3-360	Erickson Tool Co.	Automatic Stock Feeders—Complete information on the Erickson Pneumatic Bar Feed is contained in Circular K-2. (Page 360)
A-3-51	Firth Sterling, Inc.	Steels and Carbides—Forty-eight-page catalog helps users to select the right tools and tooling materials. (Page 51)
A-3-205	The Gaertner Scientific Corp.	Toolmakers' Microscopes—Bulletin 147-50 gives the details of Gaertner microscopes. (Page 205)
A-3-45	Gisholt Machine Co.	Automatic Lathe—Gisholt's Simplimatic catalog shows the savings possible with Simplimatic machines. (Page 45)
A-3-310-1	The J. C. Glenzer Co., Inc.	Lock Nuts—Catalog sheet Bb discusses the advantage of Glenlok nuts. Prices are available. (Page 310)
A-3-368	George Gorton Machine Co.	Milling Machines—Advantages of the Gorton double-duty mill are told in Catalog 1655-2803. (Page 368)
A-3-240	Hammond Machinery Builders.	Carbide Grinders—Catalog N discusses the various types of Hammond Grinders. (Page 240)
A-3-10	Hannifin Corp.	Air Cylinders and Control Valves—Bulletin 213 describes Hannifin Air cylinders and another catalog describes a complete selection of air controls. (Page 10)
A-3-IFC	The Heald Machine Co.	Centerless Internal Grinders—Heald grinders are discussed in Bulletin 2-190-1. (Page—Inside Front Cover)
A-3-381	Hydro-Borer Co.	Boring Units—Series N Hydro-Borer units are discussed in Bulletin HB-613. (Page 381)
A-3-291	The Ingersoll Milling Machine Co.	Milling Cutters—Catalog 60F describes inserted blade face mills, end mills, helical slab mills, side mills, arbor cutters, angular cutters and boring heads. (Page 291)
A-3-328	J & S Tool Co., Inc.	T-slot Clamps—Information on new type clamps is available on request. (Page 328)
A-3-289	Kearney & Trecker Corp. Special Machinery Div.	Special Machines—A special drilling and tapping machine is discussed in data sheet 1052. "Doorway to a Proven Method for Solution of Big and Small Metalworking Problems" is also available. (Page 289)
A-3-324	Keller Tool Co.	Air Drills—Airfeedrills are described in catalog sections 92 and 92A. (Page 324)
A-3-200	Lapeer Mfg. Co.	Fixture Clamps—Time economies possible with the Lapeer clamp and other advantages are discussed in catalog. (Page 200)

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Literature Number	COMPANY	DESCRIPTION
A-3-18	Lepel High Frequency Laboratories, Inc.	Induction Heating Units—Thirty-six-page illustrated catalog contains information on high frequency induction heating. (Page 18)
A-3-183	Lipe Rollway Corp.	Bar Feeds—Literature gives details on the Lipe AML Bar Feed. (Page 18)
A-3-218	Master Mfg. Co.	Machine Tool Attachments—Pictorial Operational Book and 24-page catalog discuss Master attachments. (Page 218)
A-3-185	The Maxwell Co.	Boring and Recessing Tools—Literature describes Maxwell cutters, boring tools, recessing tools and boring bars. (Page 185)
A-3-322-2	McDonough Mfg. Co.	Cutting Tool and Cutter Grinders—Illustrated bulletin RK-2 describes the Sterling Model RK-2 grinder. (Page 322)
A-3-313	Meehanite Metal Corp.	Iron Alloys—"The Handbook of Meehanite Metals" discusses advantages of Meehanite. (Page 312-313)
A-3-352-4	Merrill Engineering Laboratories	Electronic Balancers—Brochure 708 discusses the Stewart-Warner Dynamic and Kinetic electronic balancer. (Page 352)
A-3-334	Metal Carbides Corp.	Carbides—Eighty-four page catalog 55-G tells the advantages of Talide carbides. (Page 334)
A-3-340	Micromatic Hone Corp.	Honing Machines—"Cross-Hatch" Vol. 6-No. 4 discusses microhoning. (Page 340)
A-3-182-1	Morton Machine Works	Fixture Clamps and Components—Seventy-two page illustrated catalog gives full-size tracing templates of each Morton fixture product. (Page 182)
A-3-203	The New York Air Brake Co.	Pumps—Bulletin DP-350 gives facts on the PV-600 series pumps and other new developments in Dual-Vane pumps and motors. (Page 203)
A-3-59	Niagara Machine & Tool Works	Presses—New illustrated bulletin 66 describes the production and economy advantages obtainable with Niagara presses. (Page 58-59)
A-3-354	Nice Ball Bearing Co.	Ball Bearings—Design and cost features of Nice bearings are discussed in catalog 150. (Page 354)
A-3-317	The Ohio Crankshaft Co.	Induction Heating Equipment—"Tocco Induction Heating" points out the advantages of Tocco equipment. (Page 317)
A-3-339	The OK Tool Co., Inc.	Milling Cutters—OK Milling cutters are discussed in two catalogs. (Page 339)
A-3-359	Ortman-Miller Machine Co.	Air-Hydraulic Cylinders—Catalog contains complete set of 1/2-scale templates, showing all cylinders, mounts and mounting brackets. (Page 359)
A-3-254	The Parker Stamp Works, Inc.	Marking Machines—Literature discusses the Parker Hydraulic marking machine No. 650. (Page 254)
A-3-389	Pennsylvania Salt Mfg. Co.	Steel Lubricants—Lubricant for cold extruding steel is discussed in illustrated folder. (Page 389)
A-3-353	R and L Tools	Production Cutting Tools—Catalog discusses tools for use on automatic screw machines and turret lathes. (Page 353)
A-3-327	Rehnberg-Jacobson Mfg. Co.	Index Tables—Complete data sheets showing dimensions for all index table models are available. (Page 327)
A-3-196	Ring Punch & Die Co.	Punches and Dies—Twenty-page catalog illustrates complete line of perforating products. Detailed dimensions and prices for each size are given. (Page 196)
A-3-245	Seibert & Son, Inc.	Multiple Drill Spindles—Folio 1-50 illustrates and describes a complete line of multiple drill spindles. (Page 245)
A-3-211	Sheldon Machine Co., Inc.	Toolroom Lathes—Catalog G-55 discusses and describes Sheldon lathes and their attachments. (Page 211)
A-3-61	Simonds Abrasive Co.	Grinding Wheels—"Roll Grinding Wheels for Surface Accuracy" ESA 237 discusses advantages for Simonds' wheels. (Page 61)
A-3-233-1	Standard Parts Co.	Jig and Fixture Components—A description of components and economies possible with Standard products are discussed in 66-page catalog. (Page 233)
A-3-357	Super Tool Co.	Carbide-tipped Tools—Catalog 55 describes Super tools and gives price list. (Page 357)
A-3-50	U. S. Tool Co., Inc.	Stock Roll Cradles—Bulletin 90-T gives details on specifications of the U.S. Multi-Roll cradle. (Page 50)
A-3-BC	Verson Allsteel Press Co.	Presses—Sixteen-page Verson Transmat brochure describes typical machines and jobs. (Page—Back Cover)

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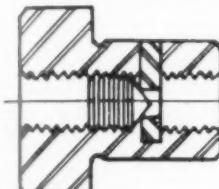
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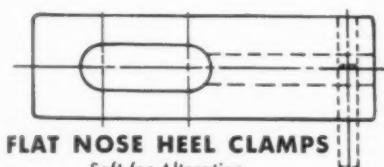
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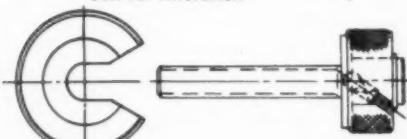


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FUNDAMENTALS OF METAL CUTTING AND PRACTICE by Max Kronenberg. Published by Springer-Verlag, W. Berlin, Germany. Obtainable from Lange, Maxwell and Springer, Inc., 122 E. 55th St., New York 22, N. Y. Price \$11.52. 430 pp.

One of the main objectives of this comprehensive revised edition written in German by an international authority on metal cutting was the derivation of scientific cutting laws and their practical application to the operation and design of machine tools. For practical application, the author's arrangement of the exponential functions of cutting speed and cutting force on a double logarithmic grid makes possible the selection of optimum cutting conditions in specific terms for solving actual problems.

An analysis of mechanical factors influencing chip formation is discussed in the section on basic metal cutting science. Using the technique of dimensional analysis, the author formulates tool temperature and life in terms of significant factors effecting them. Many chapters can be read independently of the others. Basic metal cutting equations and the values of the constants and exponents are summarized in the appendix.

INDUSTRIAL DIAMOND TRADE NAMES AND YEARBOOK, 1954. Published by N. A. G. Press, Ltd., 226 Latymer Ct., Hammersmith, London, W. 6, 50 cents. 124 pp.

This revised book contains about 2500 trade names. A data sheet supplement gives information on subjects to users and producers of diamond tools and the physical and chemical properties of diamond, the crystallography of diamond and the care of diamond truing tools, shaped diamond tools, and glaziers' diamonds.

A list of diamond tool standards, as established in England and other countries, is given, as well as a comparison of fine sieve sizes. A classified index of individual groups is added so that trade names which are used in any particular branch of the industries can easily be found.

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PRESSWORKING OF METALS by C. Hinman. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price \$9. 543 pp.

Included in this book is the use of press accessories and attachment, sheet cut calculations and designs, practical mathematics of presswork, and other features of everyday usefulness to the tool engineer. The book also shows how to select presses, covers workability of materials, and gives many basic tool designs demonstrating principles that may be adapted to a wide variety of specific presswork problems.

TRANSCRIPT OF PRESSED METAL INSTITUTE SPRING TECHNICAL MEETING. Published by Pressed Metal Institute, 2860 E. 130th St., Cleveland 20, Ohio. Price \$5. 138 pp.

This illustrated transcript covers the following subjects: safety in a stamping plant, power press problems—safety, in-process material handling, resistance welding-design, application and production; plastic dies—progress and possibilities of their use in the stamping industry. The book also includes a list of those in attendance and exhibitors.

A MANUAL OF PORCELAIN ENAMEL PROCESSING — SPRAYING, BULLETIN P. 301. Porcelain Enamel Institute, Inc., 1346 Connecticut Ave., N.W., Washington 6, D. C. Price \$1. 45 pp.

This booklet covers all phases of spraying porcelain enamel upon the base metal. Discussed is the development of the gun to atomization, the defect of malpractices in spraying, and the performance of the equipment itself, including spray guns, tanks, hoses, compressed air systems and pipeline feeding.

Also discussed are the various methods of obtaining atomization, such as compressed air, steam, hydraulic pressure, electrostatic and centrifugal forces. Operating characteristics of hand guns and automatic sprayguns are covered also.

ALUMINUM HEAT TREATING. Produced by Reynolds Metals Co., 2500 S. 3rd St., Louisville 1, Ky. Price \$1, free on company letterhead. 120 pp.

This illustrated book explains, on two different levels, the principles and procedure for heat treating aluminum alloys. The first level, in easily understandable concepts, enables the non-technical reader to obtain a basic understanding of aluminum heat-treating metallurgy. The second is a more technical discussion for the highly trained engineer and metallurgist.

abstracts of FOREIGN LITERATURE

By M. Kronenberg
Consulting Engineer

Mathematical Methods Of Production Planning

A mathematical method has been developed by a Swiss engineer for production planning, based on probability, to replace the common method of estimating the productive capacity of the plant at a given time. He reports on his findings in issue No. 9, 1954 of *Industrielle Organisation*. The author, who is associated with a company manufacturing a great variety of equipment such as machine tools, electric generators and instruments, has succeeded in reducing delays in deliveries by 81 percent in two years.

The system requires development of statistical data and graphs. Hours spent per week at a shop are plotted against the pay week. For small lot production the author recommends preparing such graphs only for subassemblies of the machines; for mass production a greater diversification is indicated. He found that it is necessary to employ only a selected group of data. The area under the curves of the graphs represents the total capacity of a plant or a subdivision of a plant or of a subassembled machine, etc. These totals are used for correlating the productive capacity and the number of parts to be produced.

The author claims that the user need not be a mathematician since only simple rules of selecting the data must be followed. The system, in substance, requires calculation of the probability of the production progress that a shop order has made at any given instant.

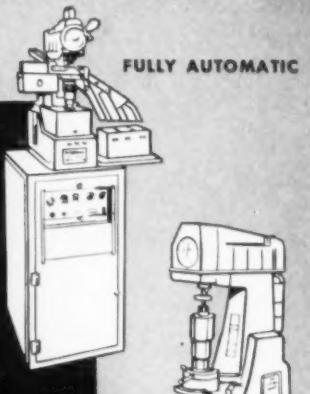
Corrosion Prevention

Corrosion of machines and tools, resulting from dousing with water in fire fighting, can now be eliminated by a process developed in Switzerland and tested by the Swiss Institute for Testing Materials (Eidgenoessische Materialpruefung Versuchsanstalt). C. Rossi reports on this development in

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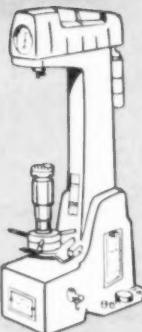
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REDWOOD CITY, CALIF.
ROLF J. GRUENSTEIN, Sup't. of Fabrication

In the fabrication of Ampex CinemaScope Sound Systems used in theaters all over the world, one casting requires 42 separate drilling, tapping, reaming or counterboring operations. This includes drilling holes from #57 (.043 inches) to $\frac{3}{4}$ of an inch, and reaming holes to $\frac{1}{2}$ inch with extremely critical dimensions on size and alignment. Without the BURGMASERS our costs to produce this part would have been almost prohibitive. Other equipment to fill the same need would have been much more expensive and much less versatile for our type production.

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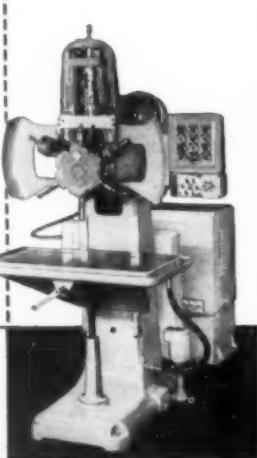
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the same issue of *Industrielle Organisation*. Essentially, the process consists of dipping tools in a chemical solution. Usually it is unnecessary to disassemble tools or dies because they need not be dry for application of the protective coating. It is claimed that the process can also be used in other cases of corrosion.

Research on Disk Springs

Belleville or disk springs, used where space limitations require high capacity units, consist of an annular disk dished to a conical shape. These springs are increasingly employed in industry, particularly in hydraulic devices for machine tools. Relatively little data have been available until recently on the strength, deflection and load carrying capacity of such springs.

For this reason, extensive investigations have been carried out at the Brunswick Institute of Technology and reported by W. Wernitz in issue No. 10, 1954 of the magazine *Konstruktion*. The paper includes descriptions of tests on springs for loads of as little as 1 lb to over 180,000 lb. Comparative data are given for helical springs so differences in space required can be seen. The investigation refers to disk springs of high and low stiffness. The report contains diagrams for the force-deflection relationships determined by tests and calculations. Detailed examples are given for the calculation of the dimensions of such springs used in bearings for preloading, in valves and in dies. In the latter application, 16 helical springs were replaced by 6 disk springs. The examples show that disk springs are being used for compensation of backlash as well as for other purposes.

The theoretical discussion deals with stresses, deformations, thickness of sheet metal, deflections of single and multiple disk springs and is supplemented by numerous diagrams and derivations of formulas for use in engineering offices.

More on the Milan Tool Show

The November 1954 issue of *Werkstatt und Betrieb* is devoted to the Milan Machine Tool Show of September 1954, reporting on many interesting details of the machines which were on exhibit there. A spinning lathe is shown equipped with a hydraulic thrust piston drive for moving the top slide and the tailstock spindle. This gives forces up to about 14,000 lb, which suffice for spinning heavy sheet.

In a grinding machine, high rigidity is claimed to have been obtained by a three-point support of the wheel head; this is illustrated in detail.

A jig borer was provided with an optical device for accurately reading table position on two screens. One of the screens is used for positioning longitudinal table, the other for positioning the cross table.

Numerous programming installations were exhibited at the show on milling machines, lathes, automatics, etc. An Italian tool control panel was shown, which renders it possible to replace tools according to wear. Counters indicate the number of pieces machined, while signal lamps are used for timing tool changes at various places on transfer or similar machines.

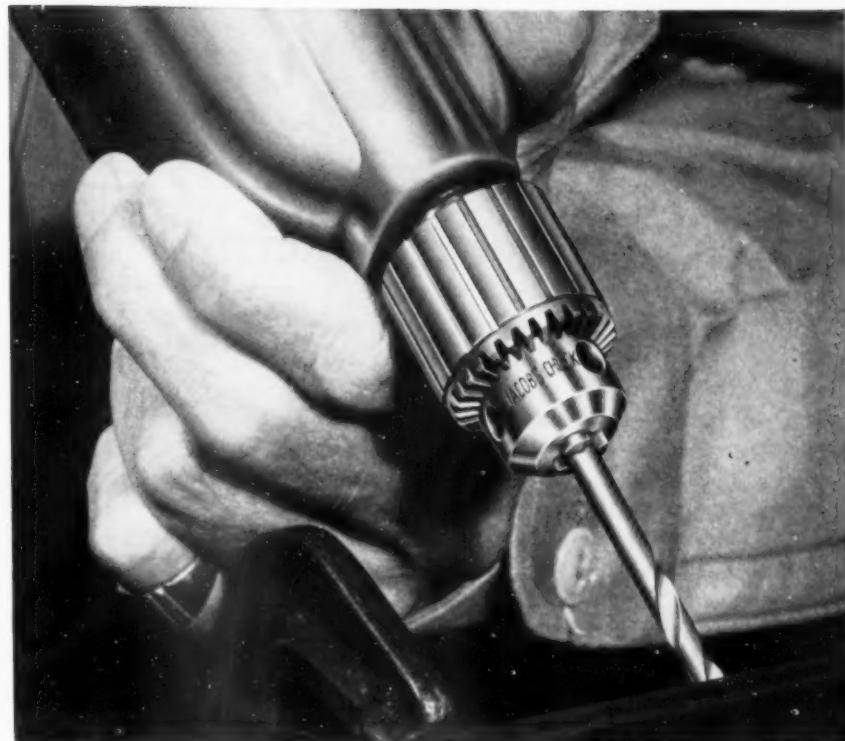
Thermal Expansion of Milling Machine Bearing

Tests on thermal expansion of milling machine spindles are reported by W. Maushake in issue No. 11 of *Werkstatt und Betrieb*. Effect of lubricants and design of the bearings, consisting of a radial and a thrust load ball bearing under preload by a disk spring, are studied. Confirming tests by the author, these studies indicate that grease lubrication usually will cause higher temperatures than oil lubrication. The temperature rise takes place during the initial period of running the machine, that is during the first two hours.

When the machine is at rest it is easy to see that the disk springs do not cause an axial motion of the inner race. However, it was found that the rotating rollers generate vibration of the inner race at a high frequency. Under these circumstances the disk springs are strong enough to move the inner race axially into the cone by a distance which corresponds to the elastic deformation of the inner race. This was overcome by inserting a supporting ring into the bearing; the inner race was no longer clamped onto the cone and the heat generated was reduced.

Industrial Design

A report on a meeting held in September 1954 in Berlin is published in the same issue of *Werkstatt und Betrieb*. Members of the Association of German Engineers (V.D.I.) met to discuss design appreciation by the user. Several papers were presented by engineers and artists respectively. Fuchs-Schwartzbach indicated that principles should be developed which would help the designer with appearance of his product. Pruss discussed the topic of modern design for consumer goods. Moebius contributed a discussion on industrial design and machine tools, while others presented papers on the appearance of office machines, airplanes, automobiles and other products.

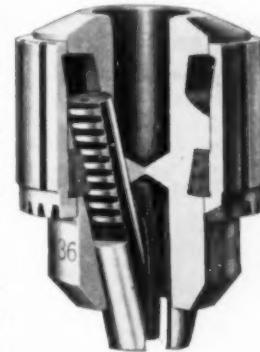


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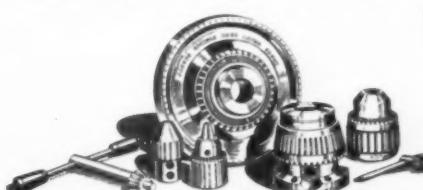
These good reasons add up to the unquestioned, uncompromising quality that makes your selection of drill chucks as easy as remembering the name *Jacobs*.



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TEST

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Part: Tube— $6\frac{1}{2}$ " O.D. x $5\frac{1}{2}$ " I.D. x 36". Outside diameter is eccentric.

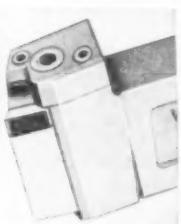
Equipment: Engine lathe employing 25 horse power.

Operation: Turn O.D.

Speed: 350' S.F.M.

Feed: .021" per revolution.

Depth of Cut: .250" and one or more finished cuts as needed from .060" to .010".

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		3	3.40 (Plus 6 regrinds)	.55	\$ 1.8
		5	7.22 (Plus regrinding)	.31	\$.062
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Plastic Models

... cut auto body development and tooling time by surface transfer technique

technical digests

By George C. Adams

Staff Engineer
Rezolin, Inc.
Los Angeles, Calif.

THOUGH PLASTIC TOOLING has been widely used in various phases of automotive tooling, many more advantages can be gained by a coordinated plan, using plastics for a surface transfer technique. This plan would start with the clay model approved by styling and engineering. From this model a female splash type mold is obtained. The working face of this mold is made of epoxy backed by an epoxy casting. This consists of a laminating type resin filled with chopped glass fibers.

Using the female master splash molds, a duplication of the original clay model is cast in phenolic, Fig. 1. Phenolic materials are used in making this model because they are stable and will retain close dimensional accuracy. They are also easy to handwork, reducing the time required to bring out highlights.

Using inch lines previously established on the model base and the angle plates which surround it, master templates are taken directly from the developed surface. An epoxy cast is used for this purpose with a dam of model-

ing clay between model and metal plate. Master templates taken directly from the developed surface are used to check the handworking of the second half of the master model.

The master templates may be used to create body drafts that may be required. Since the developed line represented by the template has been previously coordinated with the grid draft lines can be established by scribing, eliminating necessity for calculating tables of offsets, etc. This direct transfer method insures a degree of accuracy heretofore difficult to obtain.

Next, a coating of pattern makers' sheet wax is applied to the control master model to give the outside of metal surface. From this an epoxy female control master is made.

After removing the wax from the control master model, the procedure is repeated to cast a female epoxy model for inside of metal.

Using the control master model, female, as a mold, an epoxy master model in cubed form is built and placed on an adequate base. This tool is for

use by styling and engineering in the development of future models, Fig. 2.

Using the control master model (female) as a mold, the required configuration of inner panels, brackets, etc. is built up of modeling clay. A splash mold is made from this, then an epoxy laminate model is produced, supported



Fig. 2. Epoxy master model in cubed condition.

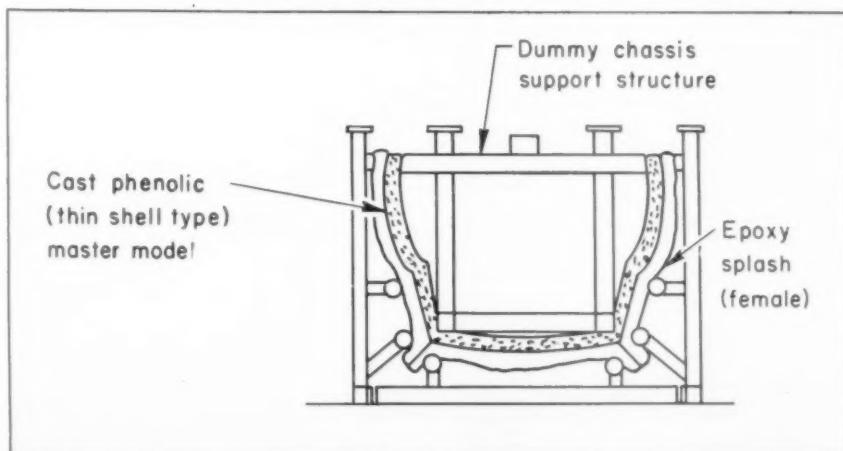
by a tubular structure, giving the final control master model for inner structures, Fig. 3.

From the control master model (female) outside of metal, an epoxy master model is laminated. With this the master modeling program is completed and actual tooling can begin on the body. Throughout these procedures the principle of transferring surfaces has been employed rather than transferring lines then using the lines to develop a surface. This means eliminates much labor and cost, but most important reduces the time for transition from clay model to finish control master models and duplicate models by several months. Control factors, such as master templates and body drafts are still retained in this proposed system.

Using the master models and duplicates, required tooling can be made. Again, here, in time costs can be saved by making use of suitable plastics for prototype tools, Fig. 4, production tools, quality control fixtures and gages and facsimile parts needed for engineering study.

The advantages of this coordinated system of plastic tooling are numerous.

Fig. 1. Casting master model made from female master splash molds.



technical digests

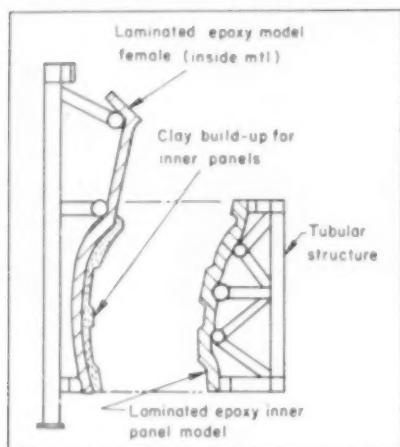


Fig. 3. Control master model for inner structures.

Master surfaces are produced with minimum error from the sculptured model by means of the surface transfer technique. Engineering development time span is reduced approximately four months. The die model program time span is reduced approximately five months. The need for further surface development is eliminated. The system permits simultaneous planning and evaluation of the entire body. Most of the major engineering changes can be made during the design phase.

The plan insures development of sheet metal assemblies that are practical and producible with a given facility. Technical manpower requirements are reduced. Body engineering is feasible from multiple locations. The procedure is the result of a carefully developed program that has proved practical and functional over a period

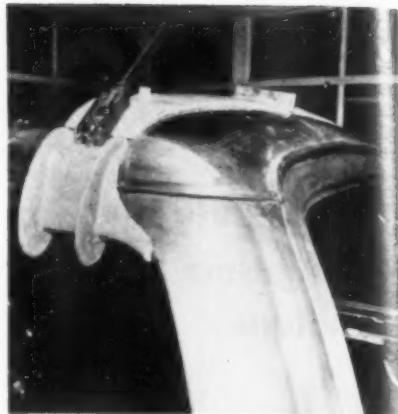


Fig. 4. Welding fixture of cast epoxy is typical of prototype tools. Often this type can be transferred to the production line.

of years. Properly applied, it will substantially reduce over-all costs of engineering and tooling a body program.

From a paper given at the 1954 Annual Meeting of the American Society of Body Engineers, Detroit, Mich.



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Automation and Machine Tool Design

By F. R. Swanson

Dir. of Engineering
Sundstrand Machine Tool Co.
Rockford, Illinois

From a comparatively simple machine controlled by an operator the machine tool has advanced to a highly automatic machine that should perform its operation continuously as reliably and with as little attention as an automatic watch. To design such a machine tool requires close cooperation of a group of engineers with imagination, engineering knowledge and training in various phases of machine tool elements.

Five basic requirements of automatic machines are:

1. Safety of the operator and maintenance men
2. Safe failure of components with respect to the machine and workpiece
3. Long life of electrical components
4. Ease of maintenance
5. Flexibility of control for the operator

Machine designers must consider hydraulic controls with a new set of standards in mind, since the onset of automation has produced marked changes in circuit design. Units that give excellent service under extreme service conditions are now available.

Technical digests

Future developments of automation machine tool design will be influenced primarily by increased application of electronic computers, digital converts, and various feedback systems in controls. Applications will include controls of the machine tool itself, work-handling, accumulation of gaging data, production output, programming, and all other possible phases of operation.

High production rates possible with carbide cutters is one of the developments that justified the expense of developing automated machine tools. It also illustrates the necessity for designers to work closely with tool engineers in order to obtain minimum cutting cycle, maximum tool life, and a minimum of down time for replacing dull tools.

From a paper 54-A-81 presented at the 1954 Annual Meeting of ASME.



Fabricating Titanium Components

by Arnold S. Rose

Spl. Products Engineer
I-T-E Circuit Breaker Co.
Philadelphia, Pa.

Fabrication of titanium components for aircraft gas turbine, guided-missile, or rocket assembly has developed remarkably over the past few years. Techniques have been modified from existing practice when applicable, and techniques peculiar to titanium have been developed.

Forming Operations

Since the greatest usage of titanium has been in the production of prototype models, tooling has generally been adapted from existing tools or has been of a temporary nature. For example, bending and rolling of sheet and bar stock has been performed on rollers and mills commonly found in a stainless steel metal shop. Forming of parts has been almost exclusively with Kirksite dies on a drop hammer. Sheet metal RC-A70 varying in thickness from 0.025 to 0.140 inch has been rolled into cylinders and conical sections with diameters ranging from 10 to 48 inches. These have been produced at room temperature with no difficulty. Sheet titanium 0.180 inch thick and bar stock ranging in section between $\frac{1}{2} \times \frac{1}{2}$ inch to 3 x 4 inches have required hot rolling. This was done by placing the flat

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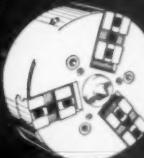
Note large amount of compensation.

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technical digests

stock into a 1300 F recirculating air furnace and holding for a length of time sufficient only to uniformly heat the material, which was then transferred to the rolling machine. Surface pyrometer observation disclosed that even the heaviest bar sections were rolled into rings at temperatures varying from 900 to 700 F.

Virtually all parts have been hot formed using similar techniques. Titanium blanks were heated in an air oven to 1300 F and then placed immediately on the drop hammer. Several blows were struck to form the part with surface pyrometer observation between blows. When required, the partially finished parts were re-

heated and hit with finishing strokes. Slight preheating of the dies to approximately 200 F has been occasionally required.

Although zinc alloy Kirksite dies were used on heated parts, no die pickup was observed and there was no difficulty during forming or subsequent welding and assembly.

Forging

Since forged parts generally are machined subsequent to forging, they may be heated to higher temperatures than used for sheet metal forming. Normally, the forging temperature is approximately 1800 F and a hard skin forms on the part as a result of contamination by the atmosphere. This skin must be removed prior to welding, to prevent embrittlement of the weld bead. To

minimize formation of this skin, heating in an inert atmosphere has been used, but is not required where sufficient skin removal follows forging.

The flow of the titanium under the drop hammer compared to that experienced with stainless steel of the AISI 300 series. Filling of the dies was exceptionally good. It is considered good practice to finish the forging in the



Fig. 1. Titanium cone produced by mechanical spinning.

lower temperature range at the end of a series of hammer blows to achieve a finer grain size and improvement in physical properties.

Spinning

Spinning is one of the most readily adaptable methods for the production of prototype units for jet engines where cylindrical and conical sheet metal parts are widely used. Titanium must be spun at an elevated temperature. For this, a group of manifold oxygen-gas burners was set up above the spinning lathe.

A mechanized version of spinning is involved in shear forming of sheet metal to produce conics. On the equipment used in this process the spinning force is applied hydraulically by steel rollers against the blank which is mounted on a rotating steel chuck. Hot spinning was necessary and since the spinning time was of short duration (forty seconds) the required heating was accomplished prior to spinning. A finished 16-inch diameter titanium cone formed this way is shown in Fig. 1.

Welding

In welding molten metal must be shielded from contact with air. Above 1500 F titanium reacts with the oxygen and nitrogen of the atmosphere, becoming brittle and unworkable. In fusion welding, the argon or helium associated

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With the inert-arc welding process in conjunction with an auxiliary supply of gas provides the necessary protection.

Spot, overlap-spot and seam welding of RC-A70 titanium was performed with excellent results. Setups were made with values of time, pressure and current normally used for stainless steel. In actual operation only slight variations from these were required.

Examples of titanium welded in the helium-filled chamber include heavy 2 x 8-inch titanium bar stock which had been rolled into ring shape. It was welded in the chamber by making deep 90 deg V bevel cuts on the mating ends and filling the grooves by depositing stringer beads of titanium weld metal as illustrated in Fig. 2.

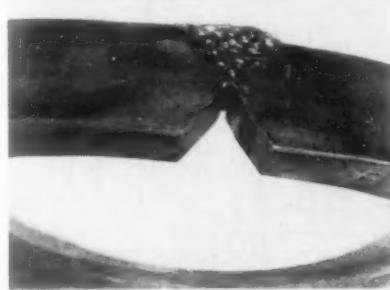


Fig. 2. Partially welded RC-A70 bar; 30-inch diameter, 2 x 3 1/2-inch section. Joint preparation is shown.

The hot forming and spinning methods developed as well as the helium-filled welding chamber are relative innovations which are particularly useful for pilot production. Modification and simplification of the principles involved will most certainly be forthcoming when titanium fabrications enter the field of large-scale production.

From a paper presented at a joint meeting of the ASME and the American Rocket Society, June 1954.

▼ ▼ ▼

Quality Control for Automatic Screw Machine Production

By Glen S. Goodman, Div. Head

Production Quality Control
McQuay-Norris Mfg. Co.
St. Louis, Mo.

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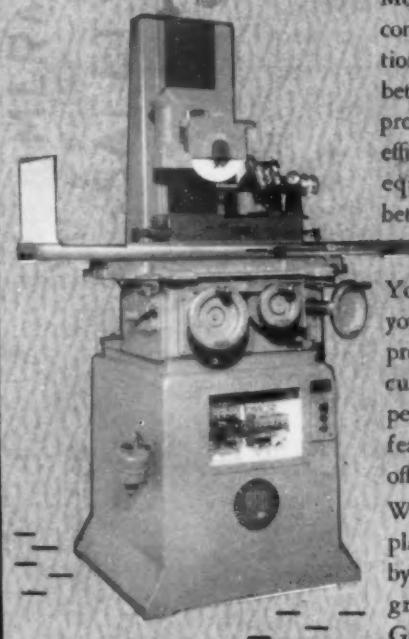
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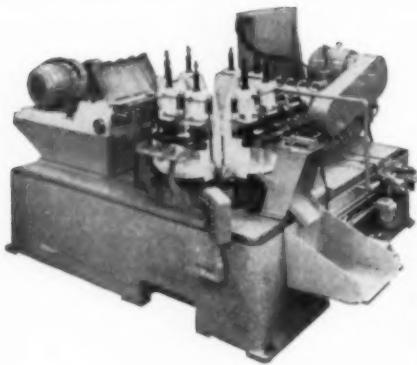
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in setting up the program. This particular program resulted from rapid reactivation of a plant for producing cores of 30 and 50 caliber armor piercing bullets. Government acceptance is based upon quality control standards. The steel used is designed to penetrate heavy armor plate rather than for machinability. It is the hardest used in screw machines. Many of the machines are not new and saw extensive service during World War II.

While the problems may be similar to those throughout the industry, as the number of machines increases, the problems increase also. This plant is one of the largest automatic screw machine plants in the world. Sampling

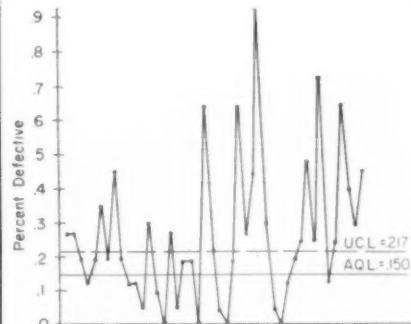


Fig. 1. Sampling of production showing out-of-control process. Each point represents a sample of 250 pieces.

tests are used at each screw machine. The cores are then passed along for heat treating, centerless grinding and final inspection.

Final inspection also uses sampling and if it finds a sample acceptable, turns it over to Ordnance to determine whether to accept or reject a lot. If final inspection rejects a lot, it is recalled and screened 100 percent for classification of defects.

Before setting up quality control a substantial percentage of production was rejected. The first step in the program was to establish p charts, based on sampling good parts from all machines. In one sampling studied for visual defectives, it was found that 44 points plotted on a p chart resulted in 22 above the upper control limit, in spite of the fact that about 75 percent of the groups of parts had been detail inspected before sampling, Fig. 1. Scrap at that time exceeded 8 percent.

The next step was to conduct machine capability tests, plotting all dimensional characteristics. These tests proved that the tools were designed so that if one key dimension was kept close to the mean, other dimensions would fall within specification limits.

Technical digests

Conference with department heads created the framework for an integrated statistical quality control program. Control charts were set up for a test group of machines. Results obtained were better than expected and consequently plans were made to place charts on all machines. This brought about almost immediate control of all dimensional characteristics.

Individual measurement charts were readily understood and accepted by

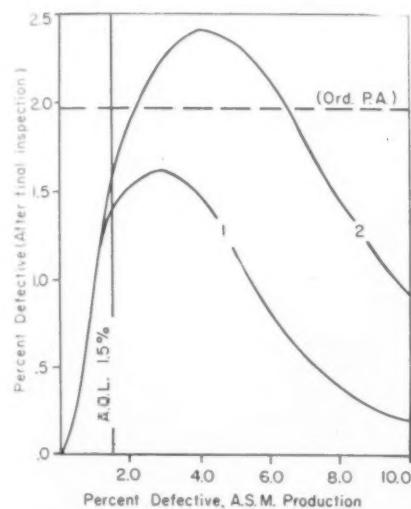


Fig. 2. Average outgoing quality curve: (1) battery inspection plan; (2) super inspection plan.

both production and production inspection. Eventually plans were made to set up X and R charts. A training program was used with all production and inspection personnel before installing these charts, however. After completion of the introductory phases of the program, the picture appeared excellent. Production had increased and a much smaller quantity of cores was going to final inspection for 100 percent screening.

Suddenly an unusual quantity of visually defective cores was discovered. Reject rates jumped 25, 30 percent and higher. Poor steel was suggested as the cause. The human factors, however, were judged more responsible for the trouble than steel or machines. Changes were made so that instead of an inspector being assigned to a certain group of machines, each was placed on a roving basis. After considerable study of various sampling plans, a double sampling plan was adopted. Adoption of the sampling plan and p charts to control visual defectives brought the rejection rate down rapidly.

In a period of less than two years the quality control program has accom-

plished the following: (Fig. 2)

1. Production inspection rejections have been reduced from 25 percent and over to 1.3 percent.
2. Scrap has been reduced from 8.5 percent to 0.86 percent.
3. Ordnance inspection rejections have been reduced from 3.5 percent to less than 0.1 percent.
4. Inspection costs have been reduced more than 75 percent. In one month this saving represented about \$363,000.
5. Average production per machine has increased tremendously.

At the outset, the quality control program met with great resistance from production personnel, which is typical. However, as the program went on, they realized that quality control was aiding them. Cooperation has grown steadily between the two departments until they function as one.

The essential qualities of a quality control program for automatic screw machine production includes the following items: extensive machine capability tests should be conducted; specifications should be analyzed from the knowledge gained from these tests; control limits should be modified where

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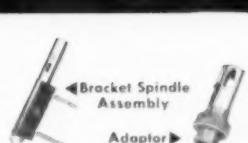
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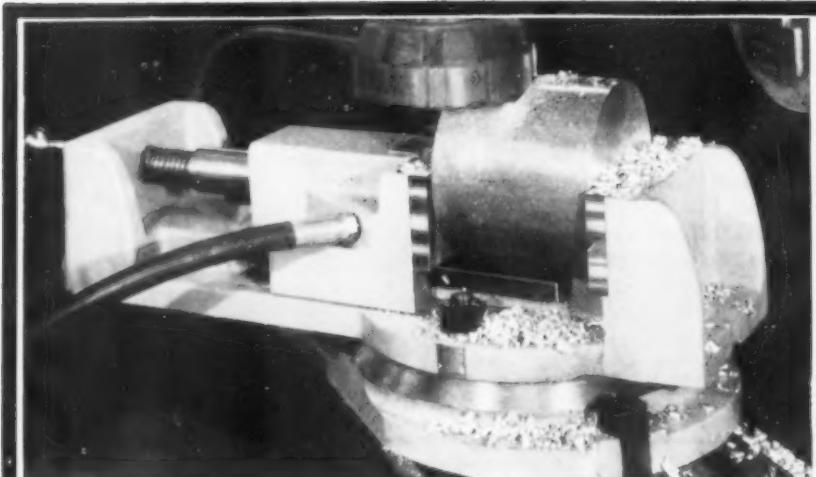
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possible; determine if *p* charts will provide control of visual defectives; make good use of the *X* and *R* charts.

From a paper given before a forum sponsored by the Michigan section of A.S.Q.C. and the University of Michigan, Ann Arbor, Mich. Sept. 1954.



Preventing Production Stoppages in Auto- matic Fabrication

by T. R. James

Engineering Research and
Development
General Mills, Inc.
Minneapolis, Minn.

Attention to operator convenience and automatic safeguards is needed to make automatic fabrication equipment practical to operate.

Good automatic machine design requires an arrangement that will leave all parts feed-in hoppers or chutes readily accessible for loading, Fig. 1.

Good visibility of the parts in process and the action of the machine is often

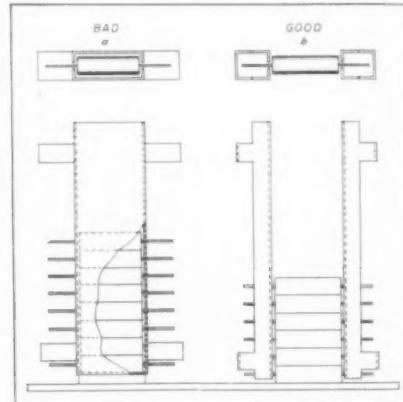


Fig. 1. Feed magazine at left may cause trouble, one at right is easily serviced.

unsatisfactory. Also needed, along with good visibility, are convenient accessibility and means of removing parts in case trouble develops, Fig. 2.

Because of the large number of different kinds of components fed to an automatic electronic fabrication machine, it would seem desirable to arrange the machine with all the feed-in hoppers on one side so that parts trucks and the hoppers themselves would not be in the way of the operator. It also follows that, in general, adjusting and release handles should be on the operator's

Technical digests

for convenience and efficiency. Adjusting devices should be designed when possible so that turning a single knob or screw accomplishes the adjust-

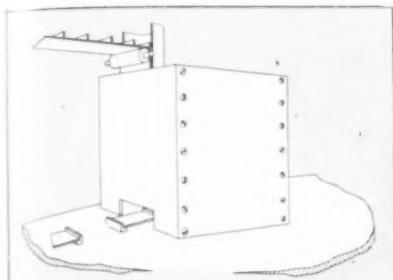


Fig. 2. Operation obscured by machinery guards. Remedy: use shelf mesh on at least one side; use hinges and latch on panel.

ment, rather than having several items which need to be coordinated.

Since one faulty operation can often lead to additional ones, and if allowed to continue cause jamming and perhaps breakage of machine parts, good design will provide automatic safeguards to prevent continued repetition of bad operation and possible damage to machinery.

From a paper given at the 1954 Automatic Production Symposium sponsored by Stanford Research Institute and USAF, San Francisco, Calif.

▼ ▼ ▼

Conservation of Industrial Diamonds

Report by Diamond Salvage & Reclamation Panel, Minerals and Metals Advisory Board Nat'l Research Council

Serious shortages of crushing bort have appeared imminent for several years. As a result, the National Production Authority and representatives of the diamond industry have instituted an educational program to conserve limited supplies of this critical material. The diamond supply for current industrial use now appears to be adequate, Fig. 1, but much interest has developed in conservation of diamond bort because of obvious advantages to users. In any such program, prime consideration should be given to methods of prolonging the life of diamond grinding wheel, utilizing abrasive properties of the diamond particles to the greatest possible advantage before they are detached or torn from the matrix in which they are held. Improved grinding practice to this end, includes such measures as limiting the use of dia-

mond abrasive wheels to purposes where other types of abrasives are inefficient or uneconomical, greater care in truing and dressing the diamond wheels, adaptation of surface feed of diamond wheels to the type of wheels employed and the character of material machined, reducing wheel vibration by use of more rugged grinding machines and the application of coolants wherever practicable.

Application of a liquid such as oil, an aqueous solution with or without the addition of a detergent of low alkalinity, or an emulsion of oil and water is generally recognized as one of

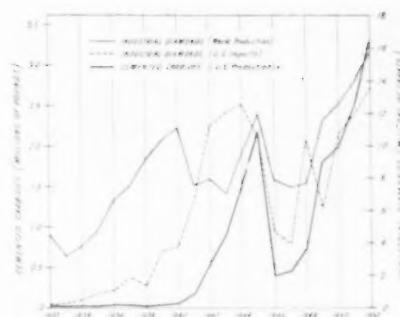
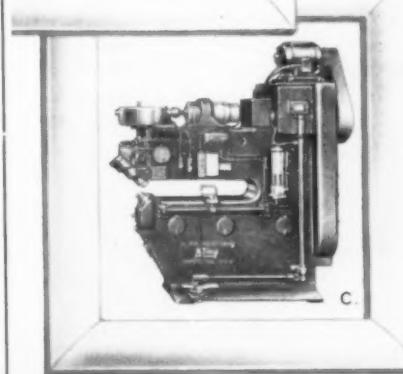
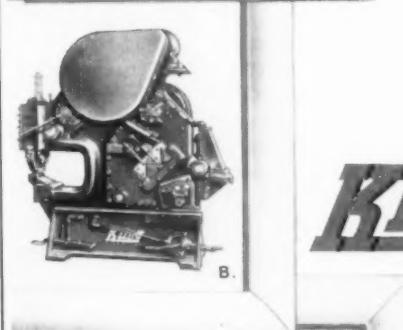
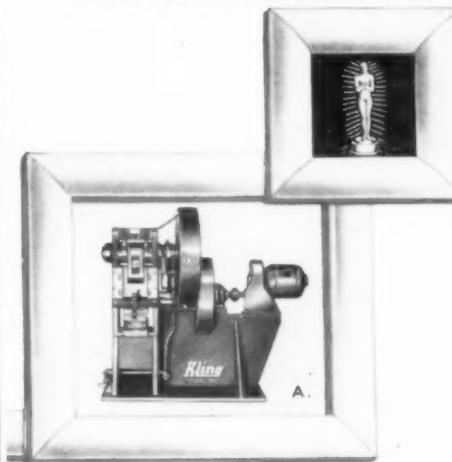


Fig. 1. World production and U. S. imports of industrial diamonds vs. U. S. production of cemented carbides.

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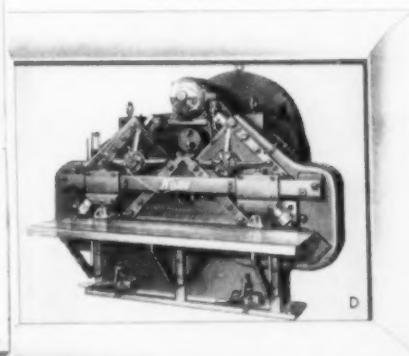
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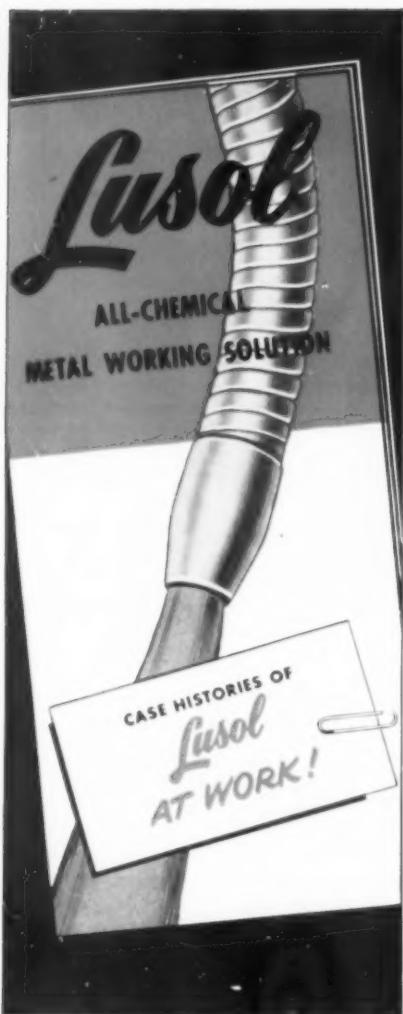
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the most effective means of prolonging the life of diamond abrasive wheels. Such liquids not only prevent excessive heating of the diamond abrasive wheel, but keep the product being machined relatively cool. These liquid applications also serve as lubricants, reducing wear on the diamond-bearing surface and premature release of diamond particles from the bond in which they are held. Means for applying a mist coolant to the surface of a diamond grinding wheel are illustrated in Fig. 2. This type of coolant has the advantage over one applied in liberal quantities, that the operator is able to observe and gage the character of his work at all times.

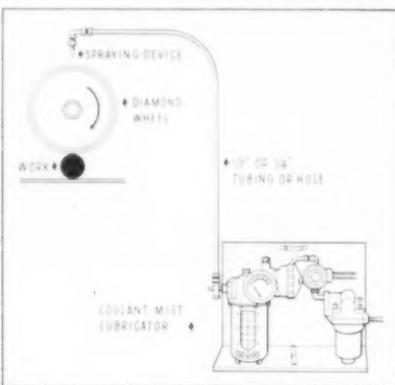


Fig. 2. Effective portable dust collector for salvaging diamond-bearing sludge.

To insure optimum concentration of diamonds in swarf and sludge, self-contained, portable collecting units should be attached to the grinding machine when diamond wheels are being used, thus segregating the diamond-bearing material from that derived from other types of abrasive wheels.

Both physical and chemical methods are employed in reclamation of diamonds from swarf and sludge. Physical methods include screening and sieving, electrostatic separation and flotation. Chemical methods, however, are essential for removal of most of the impurities present.

The diamond content of swarf and sludge currently produced may vary from $\frac{1}{2}$ to 50 carats per pound, and the size of the diamond particles ranges from 40 mesh down to less than a micron. Material as fine as 325 mesh is fairly readily recovered, but smaller particles are more difficult to salvage and submicron sizes are largely lost.

At the present prices of diamond powder, swarf and sludge containing 3 carats of diamonds per pound may be economically processed and the bulk of the diamonds reclaimed.

The total potential salvage of industrial diamonds is estimated at from 1,500,000 to 3,000,000 carats per year. In 1950, only 685,000 carats were reclaimed but it is estimated that 1,000,000 carats were reclaimed in 1953. In normal times the realistic figure for salvage is approximately 20 percent of the powder used. In times of stress, the salvage could be much higher.

In view of the importance of conserving diamond bort, it is recommended: (1) that steps be taken to prolong the life of diamond wheels, (2) that sludge and swarf be collected in a manner to insure the highest practicable diamond content, and (3) that in time of emergency canvasses be periodically conducted to determine the progress of diamond conservation through better grinding practice and salvage operations.

Summary of Report No. MMAB-55-C authorized by General Services Administration.

Reducing Expense of Waste Treatment

by C. Fred Gurnham

Department of Chemical Engineering
Michigan State College
E. Lansing, Mich.

Production of wastes appears to be inevitable with industry. Wastes may be formed in any or all of the three physical states of matter: solid, liquid and gas. It is convenient to classify them, because disposal practices are different for each. Disposal of solid wastes consists of dumping or burying on land of little value. Liquid wastes usually must be discharged from the plant property. The means may be surface streams, ditches, sewers or underground aquifers. Gaseous wastes must be released from the plant into the atmosphere.

The distinction is less clear-cut than indicated—there are many inter-relationships among these groups. Liquid wastes are the primary subject of discussion, although many of the principles outlined are equally applicable to solid and gaseous industrial wastes.

The ultimate goal of any waste disposal program is the elimination of pollution in the receiving stream. An equally important goal to the manufacturer is the pollution elimination or abatement at minimum expense.

Waste reduction within the manufacturing plant is far less costly than treatment, hence should be considered first and utilized to the greatest possible extent. Any prospect of profit from waste reduction is most likely from this

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Liquid industrial waste discharges can occasionally be reduced in an economical manner by changes in the manufacturing process. If such changes are recommended, they must be justified by definite promise of waste treatment cost reduction, to compensate for any production cost increase. An example of changes in basic manufacturing processes include descaling and cleaning of steel parts by sodium hydride instead of by acid pickles.

Metal-finishing industries, including electroplating, have made substantial reductions in waste discharge by salvage operations. Counter-current rinsing, spray rinsing instead of dip rinsing and use of a standing rinse that can be used for plating solution make-up, have all been beneficial. Salvage of spent or spoiled process solutions is often possible, with financial benefits as often as stream quality improvement.

Recovery of valuable by-products from waste streams is often a possibility. Too often, however, the by-product requires extensive manufacturing operations for its recovery, purification, and

preparation for sale.

Almost every plant presents opportunities for waste treatment by improved housekeeping and cleaner operation. Much of this is a matter of employee education but engineering ingenuity should also be applied to assist. For instance, danger of overflow of a tank may be lessened by installation of a float-controlled shut-off valve. Even drainage of solutions from materials undergoing processing can be a major factor in reducing waste as in the electroplating industry, for example.

In many plants, wastes from various operations should be collected separately for different disposal procedures. Dilute rinse waters, for instance, may sometimes be discharged directly to the stream, whereas, stronger wastes require more or less elaborate treatment. On the other hand, there are many occasions where blending of wastes from different processes is desirable and beneficial. Both acid and alkaline effluents are produced in many chemical plants. Mixing these produces at least partial self-neutralization, and reduces the quantities of chemicals needed in the treatment plant.

Increased emphasis should be placed on in-plant reduction of pollutive wastes, as the first step in the waste abatement program. In fact, an abatement program need not be officially established to authorize such studies. Increased efficiencies and economies are usually a result comparable in significance with pollution relief and so justify the work. This is not true of the next two phases of pollution abatement; treatment and final discharge. These two are items of manufacturing expense, with almost never any financial return. Stream pollution abatement by steps short of treatment is a task for the chemical engineer and one which he can undertake at any time.

From a paper "Pollution Abatement without Waste Treatment" presented at the annual meeting, American Inst. of Chemical Engineers, December 1954.



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Practical Noise Control

by A. B. Hoftiezer

Safety Supvr.,
Laverack and Haines, Inc.,
Buffalo, N. Y.

Most of these ideas were conceived and installed for some purpose other than noise reduction.

They do not necessarily bring the noise levels down to 90 decibels that has been recommended as safe. But, the reduction indicated should reduce the possibility of ear damage to employees.

One example of noise and cure was

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INDICATE A-3-251-1

March 1955

technical digests

on a drill sharpener for mining equipment. A two-inch pipe had been connected to the exhaust of the head, the pipe terminating outside the building. With the pipe connected, the noise level during operation was only 101 decibels.



Mining drill sharpener with exhaust up.

When the pipe was disconnected and the exhaust escaped in the building, the noise level climbed to 112 decibels.

In recent years diamond drills have come into use for mining operations. These machines build up a noise level in their second speed of 110 to 113 decibels. But the exhaust ports do not permit fastening a hose or pipe. When this was called to the manufacturer's attention, they immediately offered to redesign the exhaust port to permit attachment of a flexible pipe or hose.

Manufacturers of mining and similar equipment, for instance, are working on noise control now, but the process can be speeded considerably if they are impressed with the fact that the noise that a machine or tool makes may be the deciding factor in its purchase.

In conclusion, much can be done to reduce the noise level in plants by simple common sense alterations; by keeping the problem of noise in mind every time in rebuilding or altering a machine or an operation; and by stressing the necessity for quiet operation every time a new machine or piece of equipment is purchased.

From a paper given before the 1954 Nat'l Safety Congress, Chicago, Ill.



**Investment Casting
Techniques**

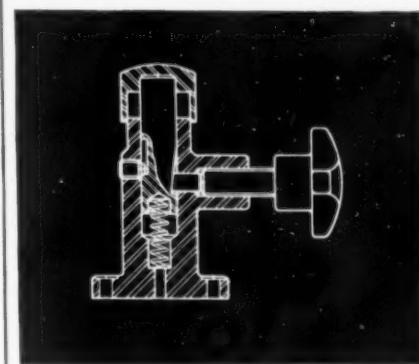
**By H. O. McIntire,
Asst. Div. Chief**

Metallurgical Engrg. Div.
Battelle Memorial Inst.
Columbus, O.

The term investment casting is applied to a rather wide range of procedures for making relatively small

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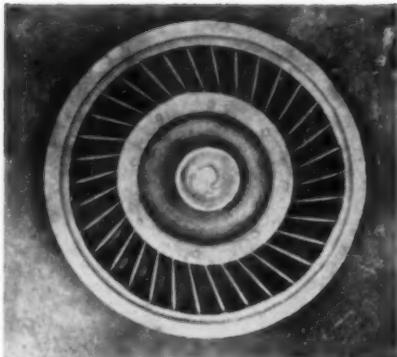
INDICATE A-3-251-2

251

technical digests

intricate castings to close dimensional tolerances and generally having smooth surfaces. Investment molds are made in one piece and therefore, have no parting lines. The principal component is the refractory aggregate. The binders are different from those used in sand molding in that they permit the refractory to be made into a fluid mix which hardens after standing a period of time. The molds are then heated to 1200 to 1850 F to remove the expendable patterns and any volatile components of the mold.

Where the single investment technique is employed, it is necessary that the refractory particles be very fine in order to obtain smooth castings. Commercial investments having the



Turbine nozzle centrifugally cast on 22nd attempt with investment vane core and baked core sand mold.

largest particle sizes as fine as 200 or 250 mesh have become accepted. These fine investments are usually mixed with sufficient liquid to give a thin consistency which permits easy removal of

entrapped air.

Where the two-step process is used a fine material is first applied to the replica by dipping or spraying. After this first coat dries, it is usually backed up with a coarser grade of material. Sometimes the coarsest particles of the backup investment are as large as 20 or 8 mesh.

Good packing of refractory particles is important. Bad packing may leave voids behind the precoating, causing it to spall during heating. Also the metal being cast may break through the unsupported precoating. Poor packing results in lower mold strength, possibly unequal expansion and greater tendency for the molds to crack during heating.

Good packing is most easily obtained when the investment contains two ranges of particle sizes: one a closely graded coarse fraction of well-rounded grains and the other, a fine (flour) grade. The coarse portion may be as coarse as 20 mesh, but the flour should be at least as fine as 200 mesh with particles ranging down to the micron size.

One advantage of coarser investments is the greater permeability which can be obtained by keeping the percentage of fines low. This greater permeability permits the mold gases to escape rapidly during firing, so that relatively high rates of heating can be used. Also, in gravity or suction casting, in particular, permeability of the mold may be important. Titanium test castings shown in the figure were gravity poured



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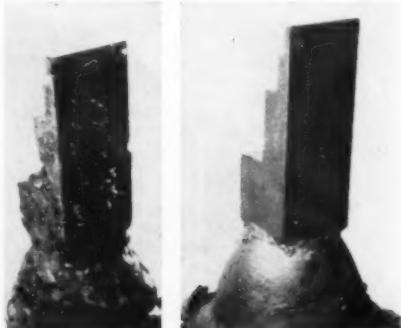
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Titanium casting at left, shows effect of low mold permeability, compared with high permeability mold (right).

into zirconium oxide molds bonded with hydrolyzed ethyl silicate. The casting on the left resulted from a mold of low permeability made from 325-mesh zirconium oxide. The gases could not escape and resulted in a porous casting. The other casting was poured into a mold having a 325-mesh precoating backed up with 30-mesh investment containing very little fine material. The greater permeability of this latter mold permitted the gases to escape and the casting was sound.

Some parts can be made best by investment casting. With other parts, a choice of methods is available and where this is true, the method that gives the desired product at the lowest cost is the one that will be used. Therefore, in order to continue to grow, the investment casting industry must constantly be looking for ways to reduce costs and obtain better know-how.

All procedures now used in making investment castings cannot be equal in performance and costs. Instead, some procedures must have advantages over others in making specific classifications of castings. Therefore, a better understanding of the advantages and disadvantages of the various procedures should permit the investment caster to select the procedure best suited for the casting involved.

From a paper delivered before the Investment Casting Institute 1954 Fall Meeting, Chicago, Ill.

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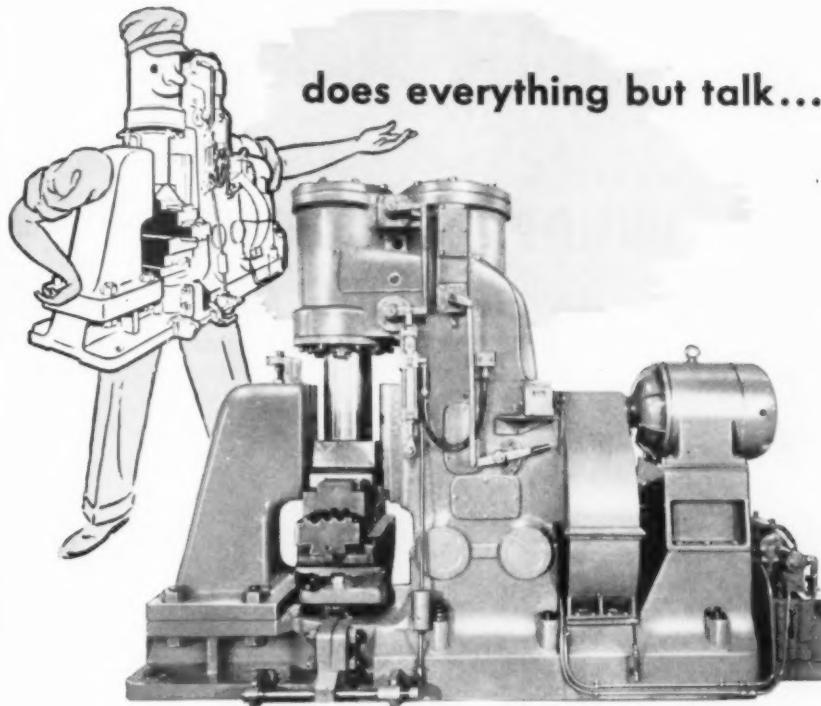
Overcoming Manufacturing Problems in Military Vehicle Production

By Mr. Charles O. Johnson

Asst. to the Gen'l Mfg. Mgr.
Pontiac Motor Div. of GMC
Pontiac, Mich.

Many manufacturing problems, including numerous design changes were involved in setting up production of a military cargo carrier. With the exception of the engine, Pontiac retained the manufacture of the more difficult and intricate parts. Seventy percent of the parts are released to subcontractors who are carefully selected. There are a total of 800 suppliers of parts and material. Small industry is well represented in this group since half of these suppliers have fewer than 500 employees.

Manufacture of the cargo carrier requires an area of 262,000 sq ft and 559 pieces of production equipment. Final assembly is shown in Fig. 1. In the interest of economy, production equipment was held to a minimum. This presented the problem of multiple set-ups on a high percentage of our equipment. Some machines have as many as 12 operations assigned, each of which requires a different setup and accurate gaging to insure that the part will not be scrapped on subsequent operations. A storage crib system had to be devised to store machined parts.



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technical digests

All machining operations must be carefully scheduled in the proper sequence and quantities to insure compliance with schedule requirements.

There are 3,788 different parts in this



Fig. 1. View of assembly and power unit drop.

vehicle. Engineering changes totalling 17,802 have been released on these parts. Many changes were requested by production to facilitate manufacture and tooling.

A total of approximately 3,500 gages are used to inspect parts manufactured for the cargo carrier. Eighty percent of these gages are also used by Ordnance. This dual usage eliminates difficulties experienced in trying to inspect parts with two different sets of gages, some of which may even be designed differently. A central inspection area was established for Carrier transmission parts where progressive inspection was not feasible due to multiple setups of production machinery. Extensive training in blueprint reading and gage usage enabled personnel assigned to this area to use all of the 2,000 gages required. One of the gaging setups is shown in Fig. 2.

There are 850 stampings. In the interest of economy required by short runs, dies are of a temporary nature. Some draw dies were made from Kirk-site and some were even made from wood. Flame hardened steel was substituted for tool steel. Sight and form gages were made from sheet metal and wool blocks.

The material used for stampings is almost exclusively aluminum, most of it being 16 gage. Particularly all parts required cutting and shearing as it was necessary to purchase standard size mill sheets and extrusions. Offal is carefully controlled to hold waste to a minimum.

A test procedure was developed to prove all functions of the transmission. Actual vehicle conditions can be simulated by connecting the dynamometer load motors mounted on two sides of the transmission. This check is espe-

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Technical digests

lly valuable for testing transmission selected for spares. With the aid of test stand, little transmission



Fig. 2. Transmission machining fixture being checked to specifications before installing on machine.

trouble is experienced in the final vehicle test.

The assembly of the hull consists primarily of riveting stampings together. Rivet holes are pierced in one member and are used as guides to drill holes through the mating member. Approximately 8,000 rivets are used.

Vehicles are completely tested with full load by Pontiac inspectors. They are then retested by Ordnance Inspection.

From a paper presented at technical session of the 1954 annual meeting of American Ordnance Association, Cincinnati Post.



Controlling Down Time in Automation

By K. O. Tech

Chief Engineer
The Cross Co.
Detroit, Mich.

The success of automation depends in a large measure on ability to control down time. Automatic factories or production lines must be kept in production in order to profit by their production rate advantages. Since the practical limit of efficiency is down time, the greatest challenge to machine designers lies in reducing it.

The two basic classifications of down time are predictable and unpredictable. Automatic programming for each individual tool is controlling the former. The latter can be eliminated by the design of simpler, better operating and more rugged mechanisms and coordinating.

An advertisement featuring a large headline "Certified CYLINDER POWER" in bold, sans-serif capital letters. Below the headline is a black and white photograph of a large hydraulic cylinder lying horizontally on a workbench. A worker is visible in the background, standing near a control panel. The overall tone is industrial and professional.

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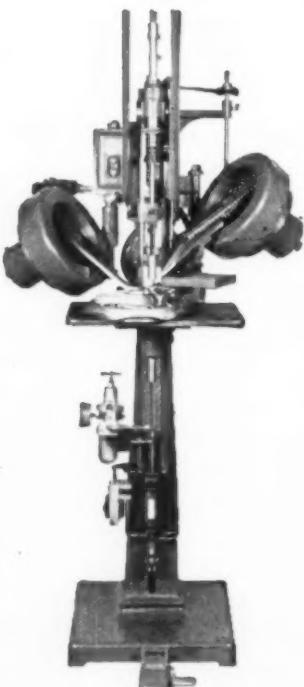
● While these champions may be tops in their field, DPS Assembling Equipment is a leading factor in the American Industrial Field—And not only in the matter of speed, (with a record of driving screws at one per second) but in economy effected through labor-saving and greater accuracy through the elimination of manual handling.

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technical digests

Particular attention must be given to means of removing chips, the cooling system, trip adjustments, provisions for ease of cleaning, leaks in hydraulic systems, location of valves and electrical controls, accessibility of cylinders and identification of components in such manner as to permit quick repair if a breakdown occurs.

From a paper 54-A-82 given before the 1954 Annual Meeting of ASME, New York City.



How to Apply Semiautomatic Submerged Arc Welding

by Robert Wilson

Lincoln Electric Co.,
Cleveland, O.

Semiautomatic submerged arc welding, as the name implies, is a modified form of fully automatic welding. The same welding process, submerged arc welding, is employed with both the full automatic and semiautomatic methods of application.

All of the advantages of automatic submerged arc welding in speed and uniformity of quality are retained. The method is semiautomatic in that only the wire feed is automatic. The direction and speed of travel of the arc are manually controlled.

Manual control of the arc permits the application of the process to jobs which because of their size, shape or quantity may not be practical applications for fully automatic equipment. The equipment for semiautomatic welding is simpler and less expensive than fully automatic and can be adapted readily for standard open arc hand welding.

The smaller capital outlay involved and the fact that the equipment is versatile frequently justifies its application where automatic equipment cannot be justified. Several manufacturers are making this type of equipment at the present time.

The equipment has been successfully applied for the past seven years. This experience has indicated certain techniques which can be used to help solve problems normally encountered when introducing a new process into a manufacturing organization unfamiliar with it.

From a paper given before the 1954 American Welding Society fall meeting, Chicago, Ill.

The Tool Engineer

Technical digests

Applying Quality Control to Stamping

By E. H. Brink

Quality Control Engineer
Houdaille-Hershey Corp.
Chicago, Ill.

In the metal stamping industry an operator has a minimum degree of control over the product which he manufactures. The specifications and tolerances of the part to be produced are built into the dies. Variations between bumpers do occur because of the variation in the steel utilized. Steel thickness, length, width, hardness, etc. all affect the end product to some degree.

At the end of the bar press line operation one inspector inspects production on a sample basis. One characteristic inspected for is handling marks or scratches which can be scored in the bar surface due to improper or hasty positioning of the stock on the dies. Other characteristics inspected at this point are: (1) die marks, (2) trims, (3) wrinkles, (4) coinings, (5) size of holes, (6) contours of critical sections of the bar and gage fit. Materials are inspected for (1) split metal, (2) stretcher strain, (3) other steel imperfections such as laminations, etc. Before installation of quality control measures on this operation this inspector was merely a sorter and a warning device in the event the operation ran into any special quality problems. No record was made as to what defects were causing the most trouble and therefore proper action could not be taken. The data now give tangible and positive facts from which supervision and top management can take prompt action.

NP charts are maintained at the operation each hour as an indication as to the current quality performance of the operation.

Corrections in the process are effected as soon as two consecutive pieces are found to be defective due to the same cause.

One other control device is of a longer range nature. That is a monthly summary report of the previous month's defects listed according to customer and model with accompanying control charts. This report is sent to supervision of the bar press line operation and the tool repair department with carbon copies to the plant engineer, plant manager and others in top management.

From a paper given at the 1954 fall forum of the Michigan section of A.S.Q.C. and University of Michigan.

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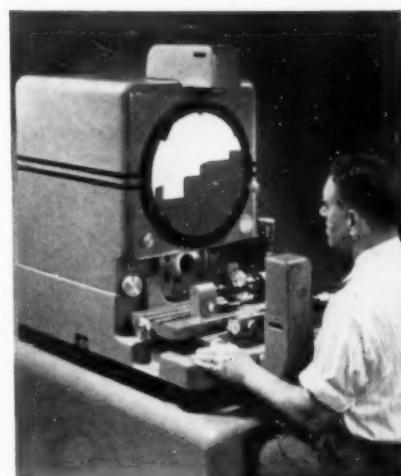
Whether you use optical gaging in the toolroom, on the production line, in assembly, or in final inspection, there is a Kodak Contour Projector designed to meet your needs.

The Model 2A and Model 30 Contour Projectors are precision measuring instruments, especially suited for toolroom use, for inspecting parts to determine machine settings, for grading components for selective fit.

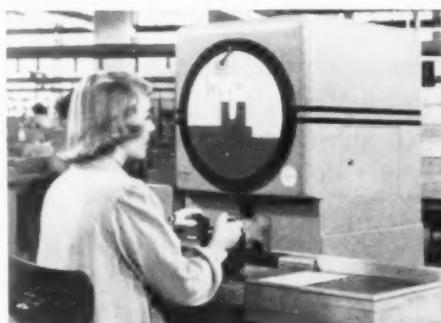
The Model 3 and Model 4 Contour Projectors are critically accurate optical comparators, designed to check complex parts quickly in quantity.

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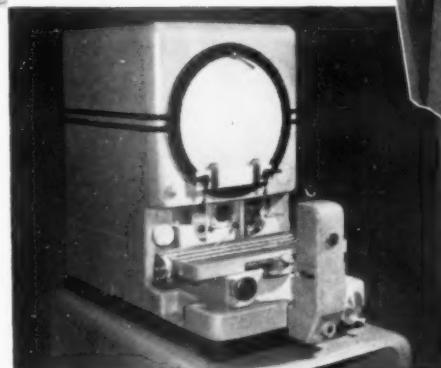
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Model 2A—for precision measurement. First choice in the toolroom, the Model 2A is equipped with micrometers graduated in ten-thousandths of an inch. Protractor ring permits measuring angles to plus or minus one minute of arc.



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Model 4—for inspection versatility. Similar to the Model 3, the Model 4 is equipped with a movable table to simplify fixturing, permit ready change-over from one part to another. Available with or without vertical beam unit.



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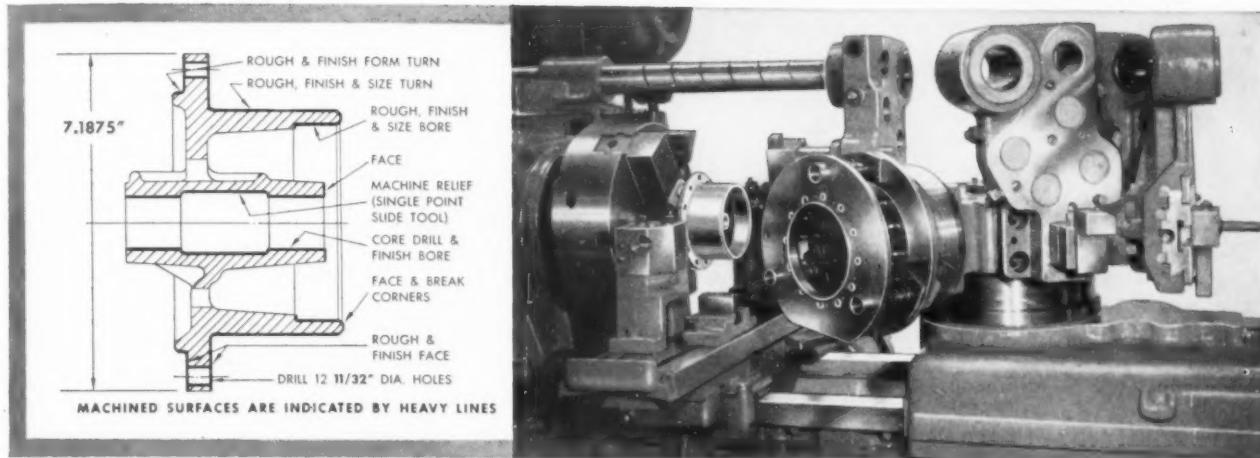


P & J TOOLING

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using a 5-DELX POWER-FLEX Automatic Turret Lathe

The cast iron bearing spider shown required machining of twenty separate surfaces, plus accurate drilling of twelve, $\frac{1}{32}$ " dia. holes. A P & J Model 5-DELX POWER-FLEX performed all operations in a single, fully-automatic turret cycle . . . floor-to-floor time was just 7.96 minutes.

P & J Tooling Engineers estimated tooling and production costs from the piece drawings, and produced tools to take full advantage of the automatic speed and feed changes available in the Model 5-DELX. The result was high-quality production — with operator fatigue reduced and the number of machines per operator increased.



The Model 5-DELX POWER-FLEX — like all P & J Automatic Turret Lathes — provides the power, flexibility and automatic operation needed for sustained high-volume precision production.

Send today for Model 5-DELX Bulletin No. 131. If your production requires Automatics of smaller or larger capacity, you will find the right machine in the complete P & J line of Automatic Turret Lathes. Specific information on request.

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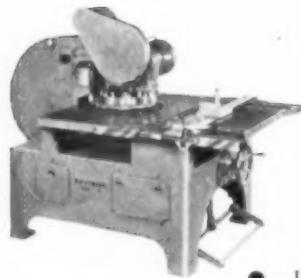
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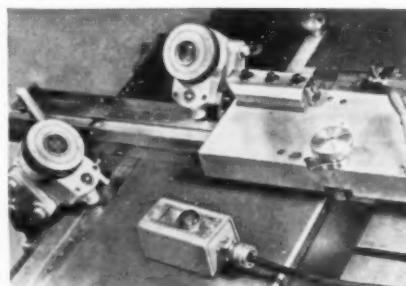
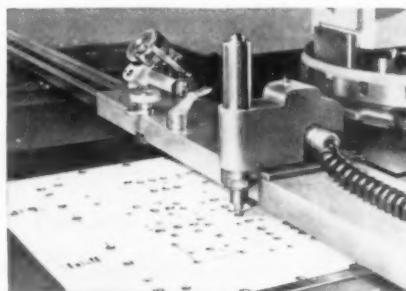
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 in 2 YEARS or LESS**

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- Hole locations are made to a color-coded template—50 or more holes per minute.

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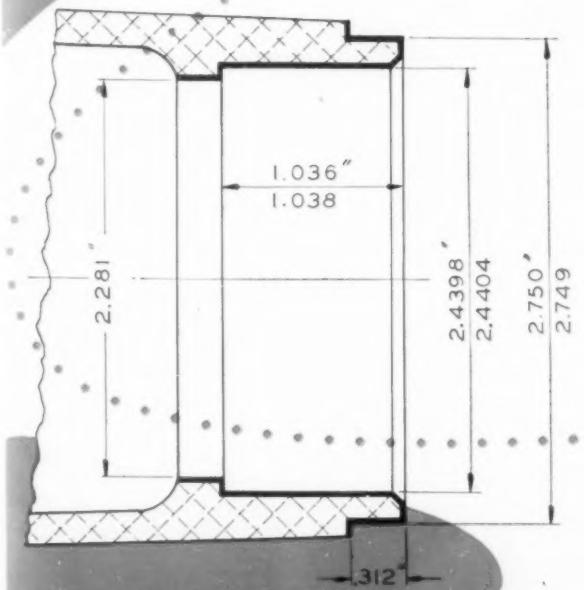


Illustration shows typical example of cluster tooling using standard Microbore units for machining seven surfaces on a main bearing housing at one pass. Each tool is independently adjusted by proven micrometer vernier principle and precise limits of accuracy are maintained on production runs.

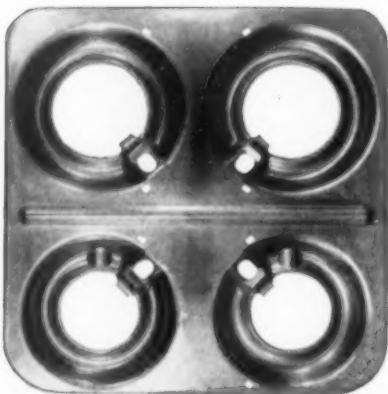
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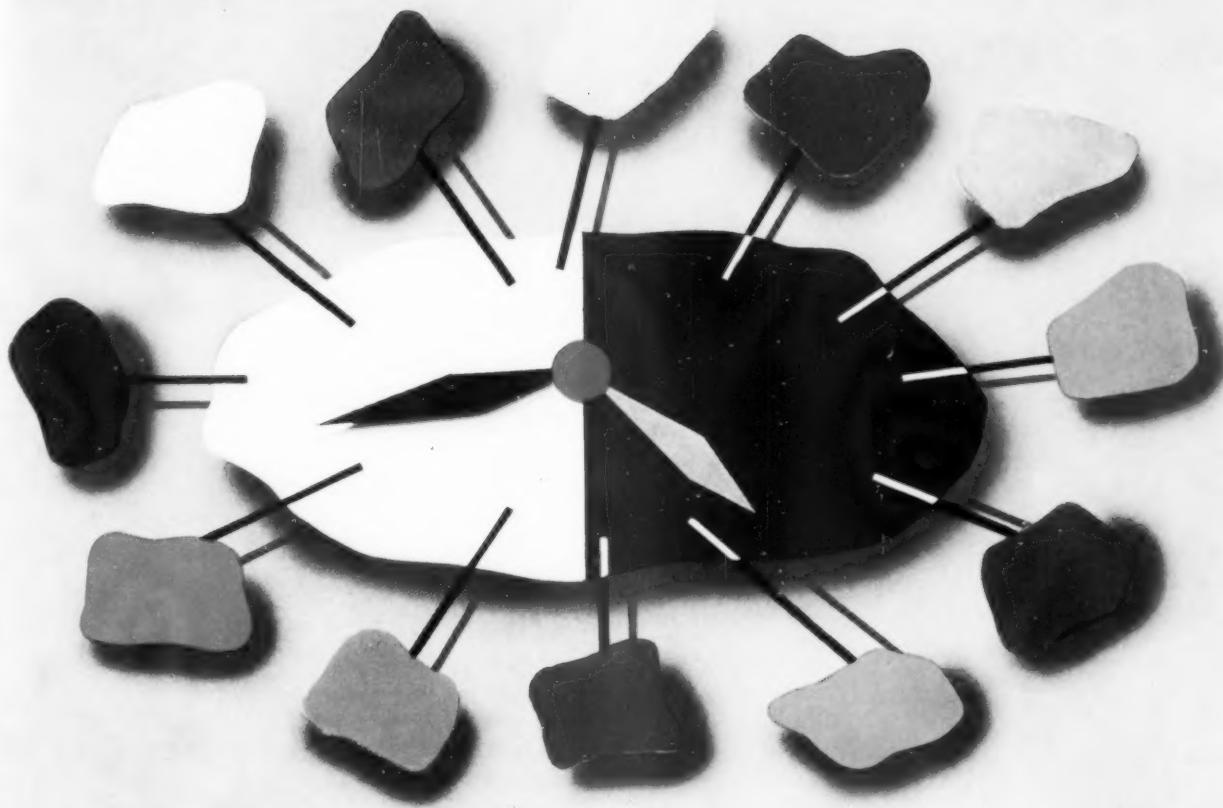
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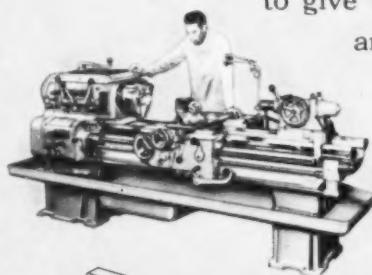
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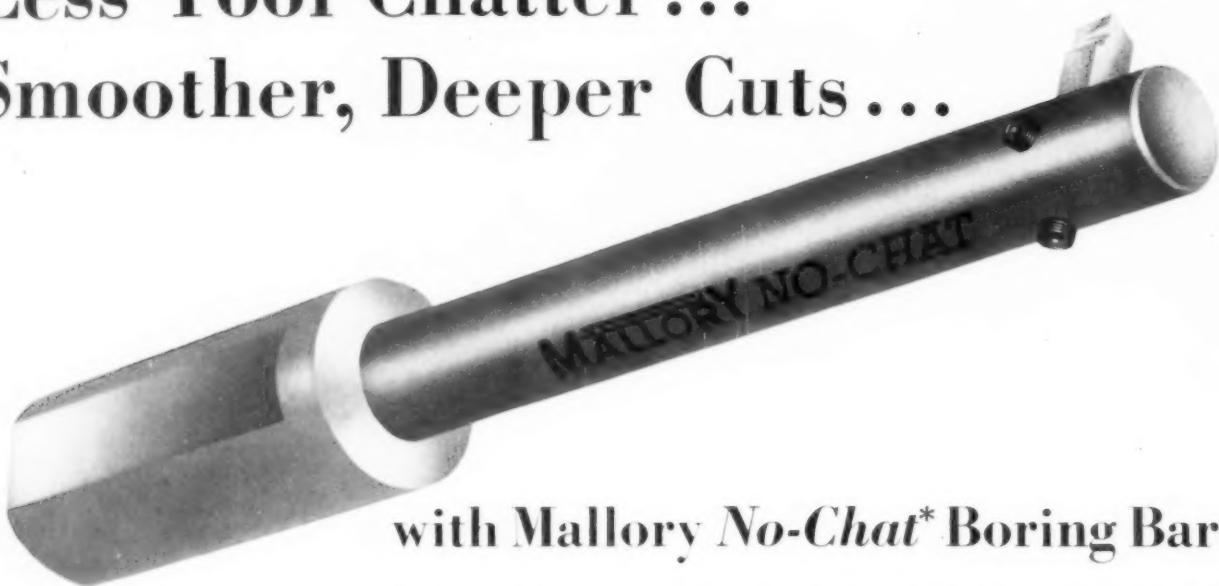


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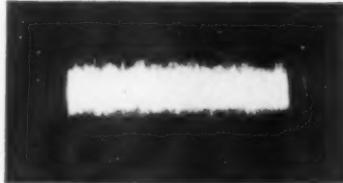
No-Chat boring bars . . . and tool shanks . . . are made of a completely different kind of alloy whose physical characteristics inherently stop tool vibration at its source. Twice as heavy and 75% more rigid than steel, they produce smoother finish even on deep cuts. Their higher price is repaid quickly, many times over, by these cost-cutting advantages:

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These oscillograms show the greatly reduced amplitude of tool vibration with *No-Chat* shanks, using identical machine set-ups, when taking a 0.030" cut in low carbon cold rolled steel at 450 SFPM.



With 3/8" steel shank and style C-8 bit.



With 3/8" No-Chat shank and style C-8 bit.

HEAVIER CUTS—Because chatter is greatly reduced you can set machines to remove more metal per pass.

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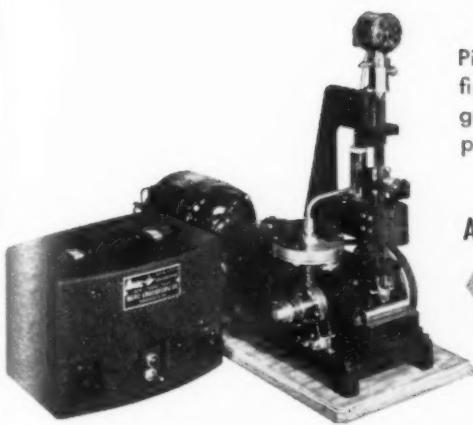
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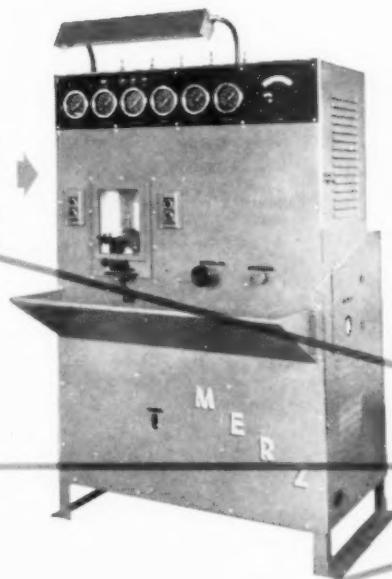


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Compares production parts to master and may be set up to automatically reject parts not conforming to the master. Fixture is capable of checking 3600 parts per hour.

Automatic Transmission Valve Assembly Test

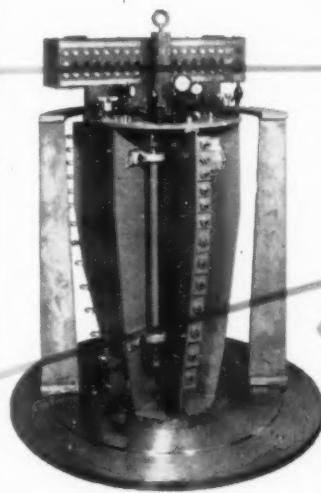
Fixture checks oil supply, kickdown on, kickdown off, throttle and reverse pressure required to operate the servo valve assembly used in automatic transmission.



Write Dept. T-3
for booklet and
additional information

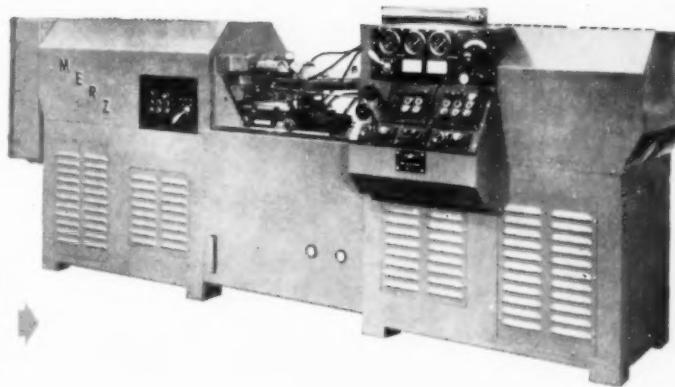
MERZ TESTING

EQUIPMENT



Stator Checking Fixture for Jet Engine

Fixture checks clearance and alignment of stator blades in the stator assembly. Any misalignment is signaled by individual lights on the panel.



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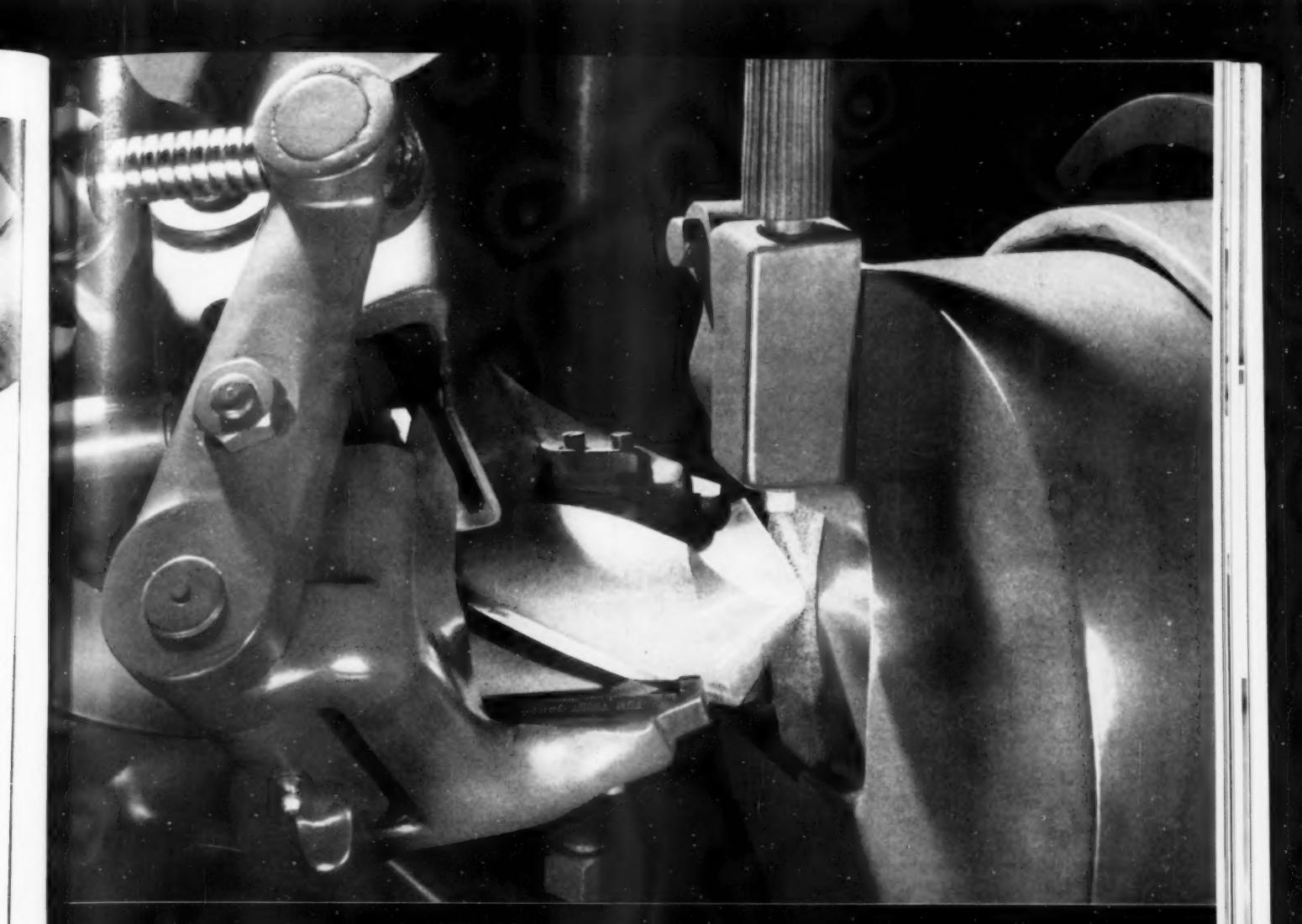
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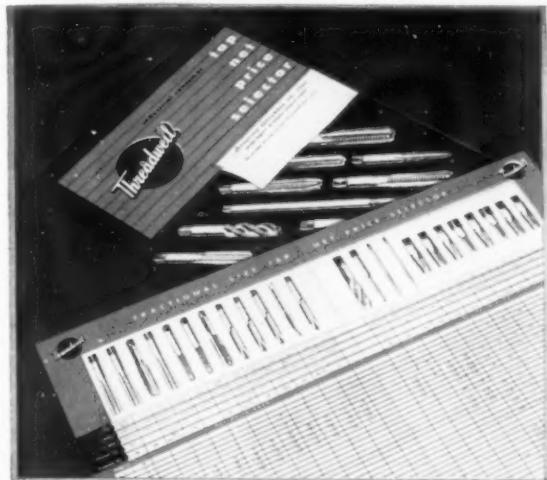
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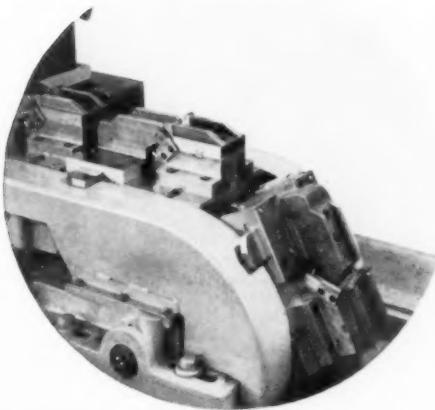


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**UNIVERSAL
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6 STANDARD DRILL BUSHING
7 UNIVERSAL INDEX PLUNGER



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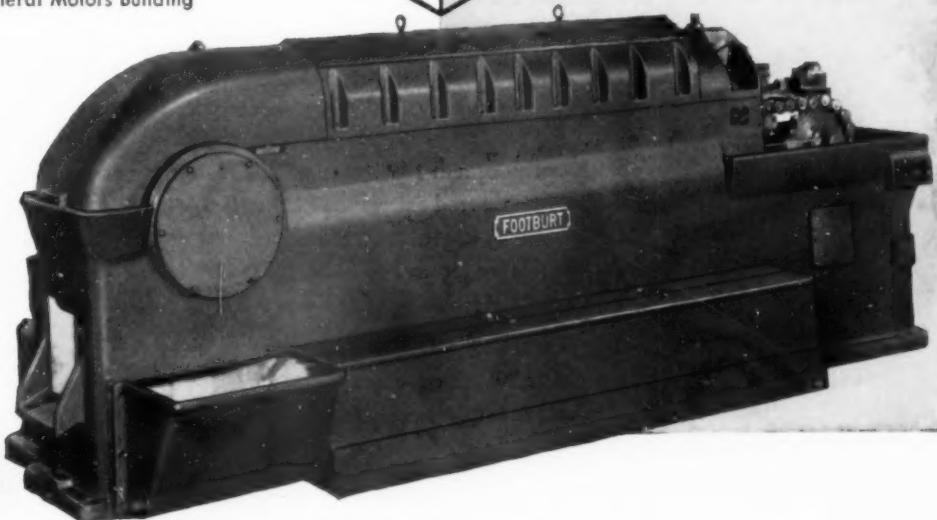
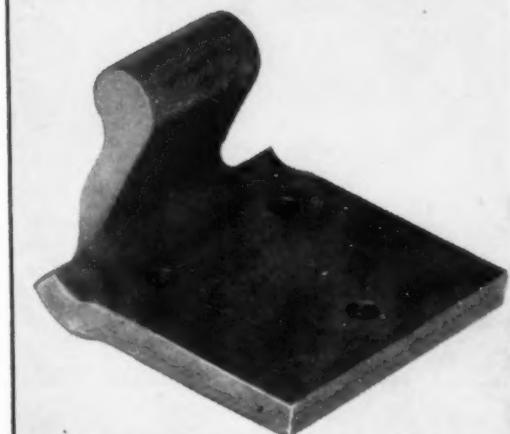
LOWER COST per piece with continuous SURFACE BROACHING of small parts...

• In many plants where large quantities of duplicate metal parts are being machined, substantial savings are being made through the adoption of surface broaching. Production is exceptionally high, close tolerances are maintained, and tool maintenance costs are much lower than with ordinary methods. Foote-Burt engineers, pioneers in this advanced machining method, have had a wide experience in applying surface broaching in many fields.

THE FOOTE-BURT COMPANY

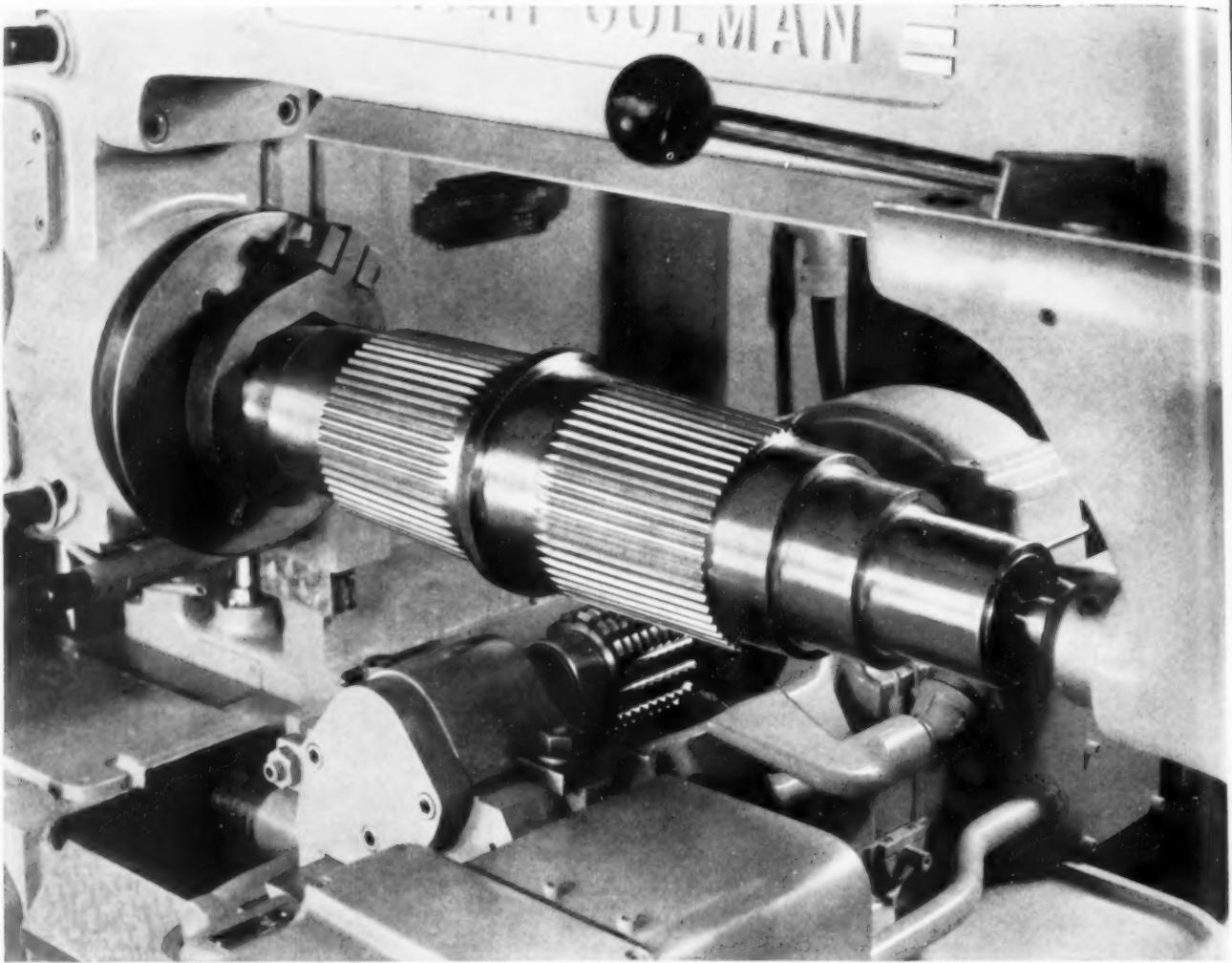
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Engineered
for
production

FOOTBURT
MACHINE TOOLS



HEAVY TORSIONAL DRIVE USES TAPERED SERRATIONS

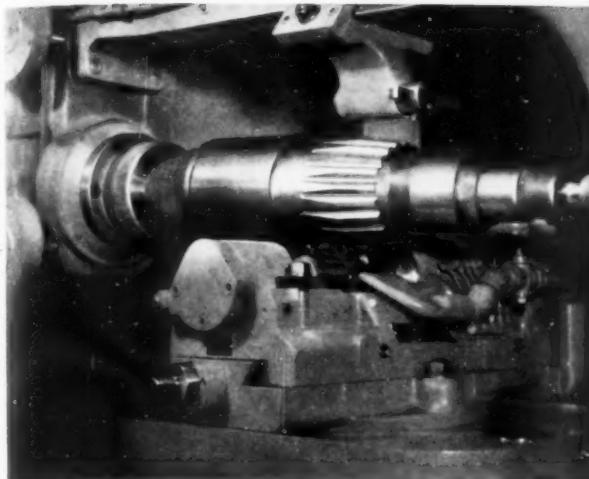
Hobbed On Specially Arranged Machines

work slide and overarm swivel up to 5°

This Barber-Colman No. 16-16 Hobbing Machine is specially designed and arranged for hobbing tapered serrations. By swivelling the work slide up to 5° to obtain the desired cutting angle, several different tapers may be hobbed on the same machine. Once the proper set-up has been made, hobbing of tapered serrations proceeds according to standard hobbing technique.

Other than the special swivel arrangement on the work slide, universal joint on the worm shaft, and a cut-away outboard overarm support, this machine is of standard design and illustrates the practicability of adapting special work to standard hobbing techniques.

When not in use hobbing tapered serrations, this machine can be used for standard spur or helical gear work and straight splines. It is equipped with an Automatic Hob Shifter for maximum hob life.

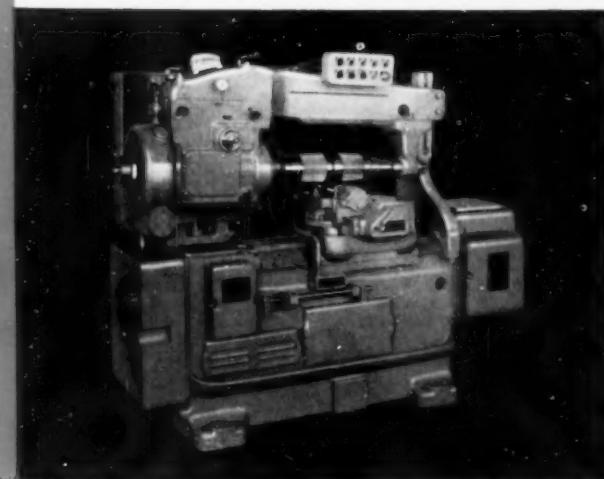


metal-to-metal fit, wear compensation

Tapered serrations provide one of the best holding means for drives which have heavy and frequently-reversing torsional loads. The metal-to-metal side bearing fit eliminates relative rotation between members, and the taper provides for take-up to compensate for wear. Typical applications are heavy reversible drives such as tractor axles and hubs, and high-frequency reversible drives such as steering shafts and Pitman arms.

involute tapered serrations

Both involute and straight-sided tapered serrations may be produced by this hobbing method. The major illustration shows the hobbing of 10/20 diametral pitch involute serrations, $\frac{3}{4}$ " taper per foot O.D., 54 teeth, and 6" major diameter. These teeth have a generated form with tapered root and outside diameter, the form changing continuously from the large to the small end. The mating part is swaged slightly undersize and the desired contact is obtained as a result of cold working the material in fitting the members. The swage is usually hobbed by the same set-up as the tapered shaft.

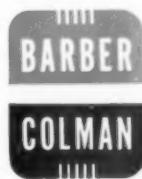


straight-sided tapered serrations

The second illustration shows the hobbing of straight-sided serrations using a single-position hob. These teeth are hobbed in 2-cuts and have straight sides with constant-width tooth spaces which permits the mating part to be broached to size after reaming to the correct taper. The internal mating part is broached one tooth at a time, providing a metal-to-metal fit which is not dependent upon cold working the material. Should looseness occur due to wear, it is taken-up on the tapered sides of the teeth.

Barber-Colman Engineers developed the special single-position hob for producing tapered serrations with a constant space width. They welcome special applications where this type of drive is an advantage and will be glad to furnish estimates on both hobs and machines for economically producing tapered serrations. Just send prints or samples marked for the attention of our Hob Engineers.

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H O B S H A R P E N I N G M A C H I N E S



Barber-Colman Company

GENERAL OFFICES AND PLANT, 101 ROCK STREET, ROCKFORD, ILLINOIS

H O B S A N D M A C H I N E S S I N C E 1 9 1 1



Automatic
Size Control
for
Cylindrical
Grinding
Machines
•
**INCREASE
PRODUCTION!**

PAT. 2,678,500

Reduce scrap. Improve quality on your cylindrical grinding operations.

The Model 229-ABD Foster "ELECTROSIZER" Gage illustrated, sizes the work during the actual grinding operation.

It features: Automatic dwell control ahead of finished size.
Automatic retraction of wheelslide at finished size.

For the first time an automatic gage which can be used to accurately grind splines or interrupted surfaces.

Write for our complete catalog of grinding gages.

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4200 WOODWARD AVENUE • ROYAL OAK, MICHIGAN

USE READER SERVICE CARD; INDICATE A-3-280-1

**NEW Apex
DISC GRINDER**

\$247*



EXCLUSIVE FEATURES

- ① FORWARD & REVERSE SWITCH
- Switch is standard equipment for left and right hand jobs, adds life to grinding disc.
- ② WRAP-OVER GUARD
- Cannot flip off, keeps fragments out of eyes, rolls back to handle work at top of disc.
- ③ DRY LUBRICATION
- All moving parts of grinder are lubed with dry lubricant, lasts life of machine.
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- Table is easily moved up and down in a single motion, exposes full disc surface.
- ⑤ SQUARING PIN
- Table can be accurately set at any degree, from 45° up or down, is automatically squared when returned to normal position.

Dealer inquiries invited.

Write for illustrated brochure and price sheet.

*\$247 covers model 15-S grinder complete with $\frac{1}{4}$ HP, 3 PH. motor, F.O.B. Los Angeles.

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STEEL BLUE®**

**Stops Losses
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With DYKEM Steel Blue Without DYKEM Steel Blue

THE DYKEM COMPANY
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Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

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Use this Press in the Shop or take it with you on the job.

Frame is 4" welded channel iron. Has $\frac{1}{2}$ " stroke, $2\frac{1}{2}$ " diam. ram. Valve operates piston in both directions.

Adjustable platform. Positive power Hand Pump with handle. 2000 PSI pressure gauge.

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Gives 20,000 lb. thrust using 1500 PSI line pressure as obtained from our hydraulic pumps. Will produce up to 40,000 lb. thrust with 3000 PSI. Can also be used on a low pressure used air system. Has 4" bore; 18" stroke; 3000 long. Ideal for shop.

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HYDRAULIC HAND PUMP

Operating pressure 1500 PSI. Cap. 1.5 cu. in per complete cycle.

1275

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A-2B FLOATING PISTON TYPE — 4" x 18"

Built to stand 2,000 PSI.

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NOTE: Stocks include bargains in Hydraulic Pumps — Valves — Motors — Boosters — as well as Oil, Water and Fuel Pumps, etc.

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OVER 320 PAGES

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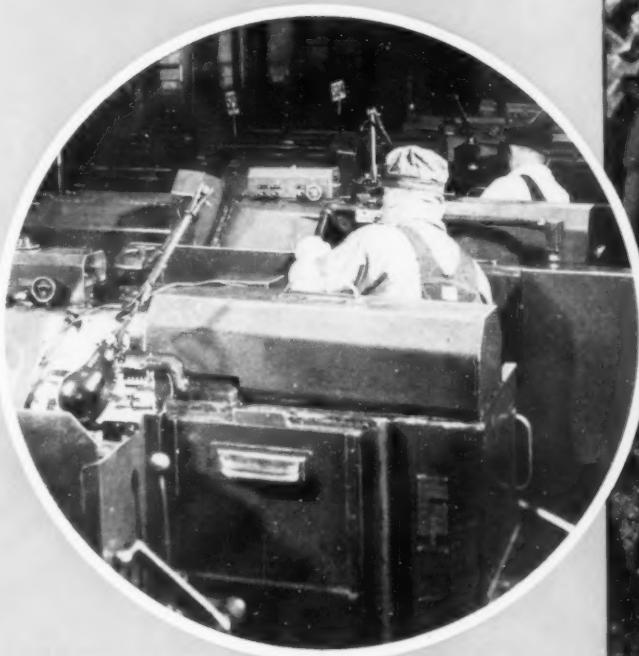
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The Tool Engineer

**"To increase production and tool life
on non-ferrous metals,
we recommend**

GULF CUT-AID,"

say shop foremen and tool engineers.



Here are a few typical examples of the results reported by machine shops since they switched to Gulf Cut-Aid:

- "... does a better job on aluminum than any cutting fluid we've ever used."
- "... proved superior to 12 other cutting oils we tested. We got 10% greater production, 50% longer tool life;"
- "... upped production from 700 to 1000 parts per hour;"
- "... rejections entirely eliminated, production increased 20%."

Results like these are possible because Gulf Cut-Aid has a high rate of penetration, good "wettability," and excellent cooling properties. It also

contains an effective anti-oxidation additive which helps prevent gum and sludge formation in the coolant system. And it will not corrode or stain metals.

In addition Gulf Cut-Aid is an effective energizer for other cutting oils, regardless of type or viscosity. This blending makes possible higher production speeds and results in improved finishes and longer tool life.

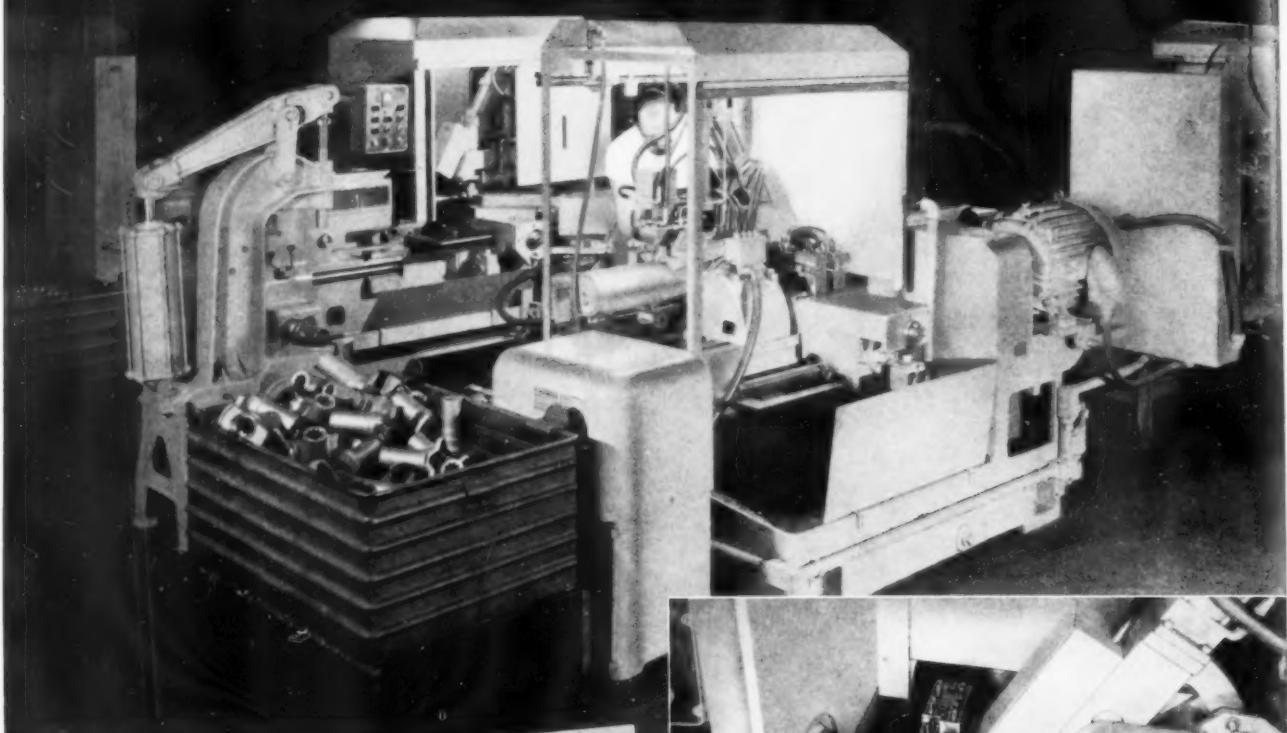
Have a Gulf Sales Engineer show you how Gulf Cut-Aid and other Gulf quality cutting oils can help you improve machining practices in your shop. Call him today at your nearest Gulf office.

Gulf Oil Corporation • Gulf Refining Company
1822 GULF BUILDING, PITTSBURGH 30, PA.

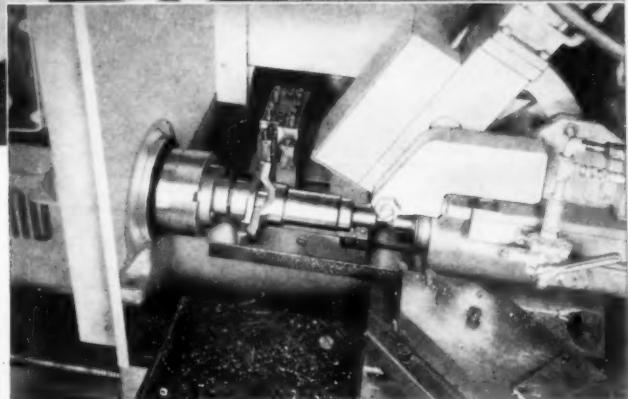
THE FINEST PETROLEUM PRODUCTS FOR YOUR EVERY NEED



Turning Time Cut From 4 $\frac{1}{2}$ to 2 Minutes Per Piece



With a **SUNDSTRAND**
Automatic Lathe Equipped
With Automatic Multi-Cycle
Tracer Control



Two Sundstrand Automatic Lathes with automatic multi-cycle tracer control for machining Universal Joint parts.
Inset: Close-up of tracer control.

Various sizes and types of Universal Joint parts are turned on these Sundstrand Automatic Lathes equipped with Automatic Multi-Cycle tracer control. On one lot of parts, machining time was cut from 4-1/2 to 2 minutes per part. Savings on other sizes of parts are comparable.

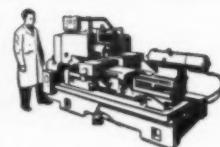
The lathe is also equipped with adjustable facing attachment for chamfering or undercutting. These high producing Sundstrand Automatic Lathes are easily changed over for handling the various sizes of parts.



"Engineered
Production"
Service*

*REG. U.S. PAT. OFF.

AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS

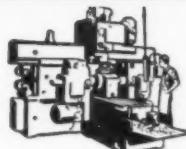




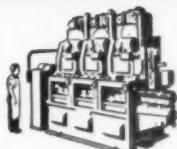
Unit Produces Ruff, Semi-Finish and Finish Cuts In One Automatic Cycle

With this attachment and controls, ruff, semi-finish and finish cuts can be taken with one turning tool in one automatic cycle. The control can be set up for one, two or three cycles depending on stock removal and job requirements. The regular cross feeding rear slide can be used to square up shoulders, chamfer, etc. Cycle changing is quick and easy, usually 15 minutes or less, with actual time dependent on the number of facing tools required in the job set-up. Illustrated above are typical parts turned at Mechanics Universal Joint Division, Borg Warner Corp., Rockford, Illinois, using Sundstrand Automatic Lathes equipped with the new Sundstrand Multi-Cycle Tracer Control. The Universal Joint parts illustrated are just a few of many that can be turned efficiently on this equipment. The diameters and tapers are turned with simple single point tools. Small lots or large can be handled easily and quickly.

TRIPLEX RIGIDMILS



SPECIAL MACHINES



features

1. Easily changed over for different jobs.
2. One template for all three cuts.
3. Change-over time to standard operation approximately 45 minutes.
4. Three turning cuts in one automatic cycle.
5. Cross feeding rear slide operates in automatic cycle for facing, grooving, chamfering, etc.
6. Because of the complete automatic cycle, one operator can run several machines.

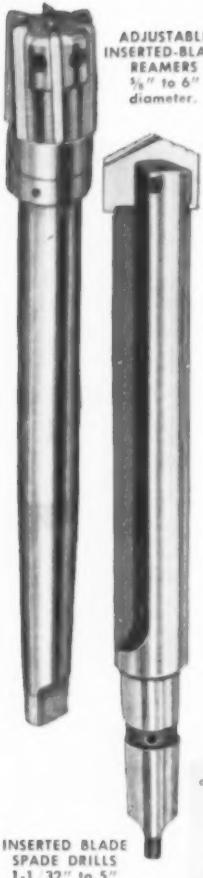
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SUNDSTRAND Machine Tool Co.

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diameter.

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CONCENTRIC the original,
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spring loaded
live centers

AUTOMATIC THRUST ADJUSTMENT

Spring loaded spindle maintains constant tail stock thrust.

LONGER LIFE

Needle bearing distributes bearing stress over greater surface, thus holding close tolerances for much longer time.

FASTER SPEEDS

Smaller turning radius gives much higher RPM rate than ordinary live centers.

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GREATER LOAD CAPACITY

LESS
OVERHANG
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MORE
RIGIDITY
... MORE
WORKING
RANGE

JAM PROOF



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CONCENTRIC TOOL CORP., 2486 Huntington Dr., San Marino, Calif.
USE READER SERVICE CARD; INDICATE A-3-284-2

new BOICE dial snap gage

REDUCES
OPERATOR
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BOICE Dial
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size 0"-1"

The BOICE Dial Snap Gage has been carefully designed for optimum balance and legibility with operator fatigue an uppermost consideration. The gage is available in sizes 0" to 4" each with a 1" range. It can be supplied with a selection of indicators.

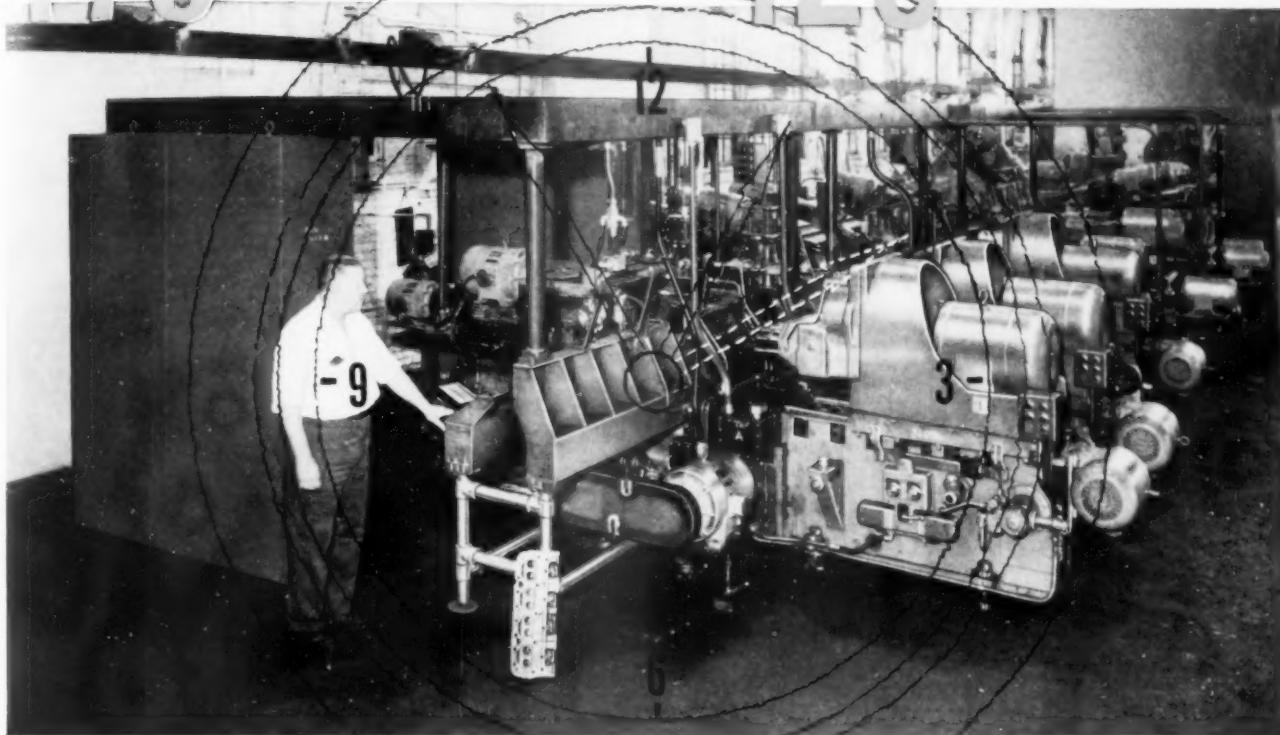
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STAATSBURG, NEW YORK
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USE READER SERVICE CARD; INDICATE A-3-284-3

The Tool Engineer

175 Machine Operations on 128 Cylinder Heads



= 22,400 OPERATIONS PER HOUR

Functioning automatically in TIMED SEQUENCE, this BAUSH TRANSFER LINE is producing accurately machined parts at low cost for a leading automotive manufacturer's new V-8 engine.

This 21 Station Baush Transfer Line consists of:

- 1 Loading; 13 Working; 2 Roll-over; and 5 Idle Stations having
- 12 Vertical Angular Model "S" Mechanical Leadscrew Units —
- 4 Horizontal Model "S" Mechanical Leadscrew Units —
- 1 Vertical Model "S" Mechanical Leadscrew Unit —
- 4 Horizontal 30F-18 Hydraulic Units —
- 1 Vertical Hydraulic Unit mounted on hydraulic horizontal slide —
- 2 Vertical Angle Hydraulic Checking Units —
- 22 Fixed Center Heads having a total of 175 spindles —
- 6 Transfer Power Units —
- 2 Roll-over Fixtures —
- 6 3-position Transfer Sections with Arch Fixture and Bushing Plates.

OPERATIONS:

Mill — Drill — Ream — Chamfer — Counterbore and Countersink — Spotface and Tap.

PRODUCTION:

Approximately 128 Cylinder Heads per hour at 100% efficiency.





LANG Tool and Die Manufacturing Company, Glendale, California, use Cerromatrix to anchor small punches in high-production lamination dies. They guarantee these dies for 2,000,000 blanks minimum.

Punches are held vertically by cap screws and mounted in Cerromatrix. Very small punches are held by circular washers outside and inside of punch, located in a $\frac{1}{8}$ " groove ground in the punch. All small punches are guided through a fixed stripper with Nitrided inserts.

At least $\frac{1}{3}$ of the length of the punches is held in Cerromatrix. The photograph shows a die for rotor and stator blanks. It runs 135 strokes per minute. Eighty to eighty-five thousand blanks are obtained per sharpening of die. Send for literature.

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NOW you can BROACH THESE SHAPES *and others* in your OWN PLANT

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LOW-PRICED
PIONEER BROACHING
MACHINE!

Model VM 215
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LESS MOTOR

Here's the high production, low-cost way to machine *all* shapes... with accuracy to "tenths" and with unmatched uniformity! Performs both internal and surface broaching. Makes round holes *really* round, cuts ovals, squares, hexagons, etc.; makes internal keyways and splines, external flats and thousands of profile variations at *one pull of the broach!* So low in cost it can pay for itself in weeks alone! If you have a *contour* problem, think of broaching, then call Pioneer. Hand and power driven models available, 15" stroke, 2 tons capacity. Ask for literature!

NOTE: PIONEER can also supply all your broach requirements... standards or specials. Ask for quotes!

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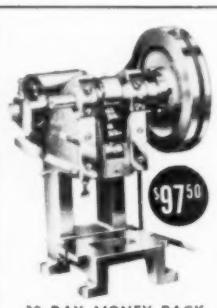
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Powerful—Dependable—Economical
For Light Work—Stamping, Forming, Riveting—Metal, Fiber or other material, Overall height 19 $\frac{3}{4}$ "—Base size 9" x 8 $\frac{1}{2}$ ". Die Bed 6 $\frac{1}{4}$ " x 8"—Ram face 11 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ ". Ram stroke $\frac{3}{4}$ "—Positive $\frac{3}{4}$ " ram adjustment. Sturdy, Single pin, non-repeat hand lever clutch. V-belt drive—Weight 105 lbs. Requires only $\frac{1}{3}$ H.P. motor.
The machine of a thousand uses! Adequate for many types of work now done on large presses at greater expense.

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fob Clinton, Missouri. Includes motor bracket, V-belt and motor pulley. (Less motor)

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SLIP-PROOF

STRONGEST CHUCK MADE

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Ames Portable Tester making hardness test on large casting while being machined.

You can get accurate, dependable tests anywhere, anytime, with Ames Portable Hardness Testers. No delays, no waiting for laboratory tests, no cutting off specimens. Anyone can operate.

Ames Testers are light in weight — may be taken to the work — read directly in the Rockwell Scales. Are made in sizes from 1" to 8" capacity for testing rounds, flats, sheet stock, tubing, odd shaped pieces and assembled parts.

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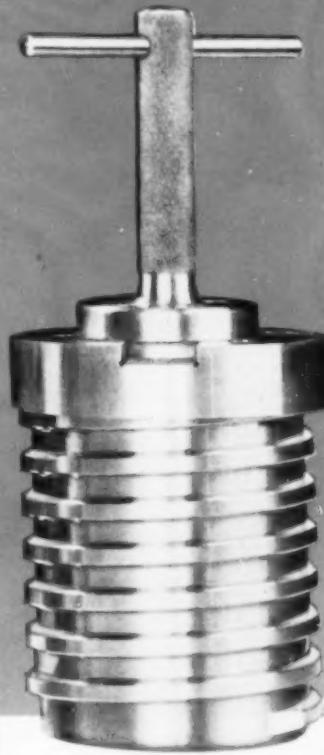
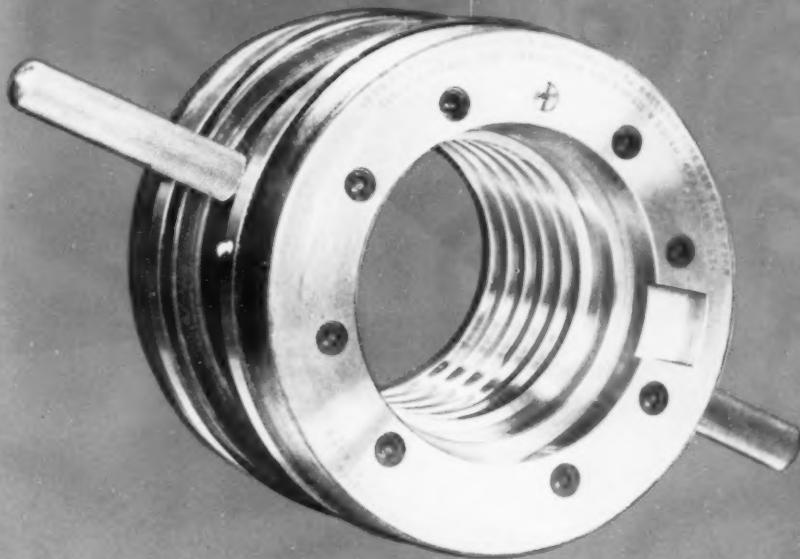
AMES PRECISION MACHINE WORKS

Makers of Ames Precision Lathes and Bench Millers
WALTHAM 54, MASSACHUSETTS

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The Tool Engineer

Are you Guessing ... or Gaging?



It pays to check the measure of component parts with Bath Gages, following precision machining operations. The use of guesswork or inferior gages . . . is false economy.

The special gages shown here were built to close tolerance by Bath craftsmen and illustrate the skilled workmanship that goes into the manufacture of all Bath Gages, from the most complicated design to the regular line of stock gages.

No two ways about it . . . quality shows up . . . long wear pays off . . . Bath Gages cost less in the long run by assuring extra long service at checking points.

If it's a question of "by guess or by gage" . . . a Bath representative will be glad to show you how Bath Gages will standardize your inspection routine . . . save time and money.

The Ring Gage shown above (with its accompanying Check Plug) is used for measuring the following elements of a 75 mm Gun Breech Plug: major and minor diameters, shoulder diameter concentricity, thread and key slot location from shoulder, and length of shoulder to end. Dimensions are 5.1512"- .750" Pitch, 30 degree Included Thread Angle.

JOHN BATH & CO., Inc.
28 Grafton St., Worcester, Mass.

RING THREAD GAGES • PLUG THREAD GAGES • INTERNAL MICROMETERS • GROUND THREAD TAPS



big news in tooling plate is Dow Magnesium!

It's light in weight, the price is low, machinability is unsurpassed . . .
magnesium opens a new door to low-cost tooling for you

's new magnesium tooling plate is now available from distributors across the country. This is the lightest tooling plate ever made—a full third lighter than aluminum, one-fourth the weight of steel. Yet you'll find its price lower than other commonly used tooling materials.

Magnesium tooling plate is rolled—not cast—providing greater sizes, freedom from porosity, better toughness, and a smooth mill surface. Thermal flattening assures positive di-

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Extra rigidity, good weldability and high strength-to-weight ratio, too, make magnesium plate ideal for jig, fixture and tooling uses. Call your Dow magnesium distributor, today, for price and delivery data, or write THE DOW CHEMICAL COMPANY, Midland, Michigan.

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the Dow Booth, No. 809, at A.S.T.E. Convention
March 14-18 in Los Angeles

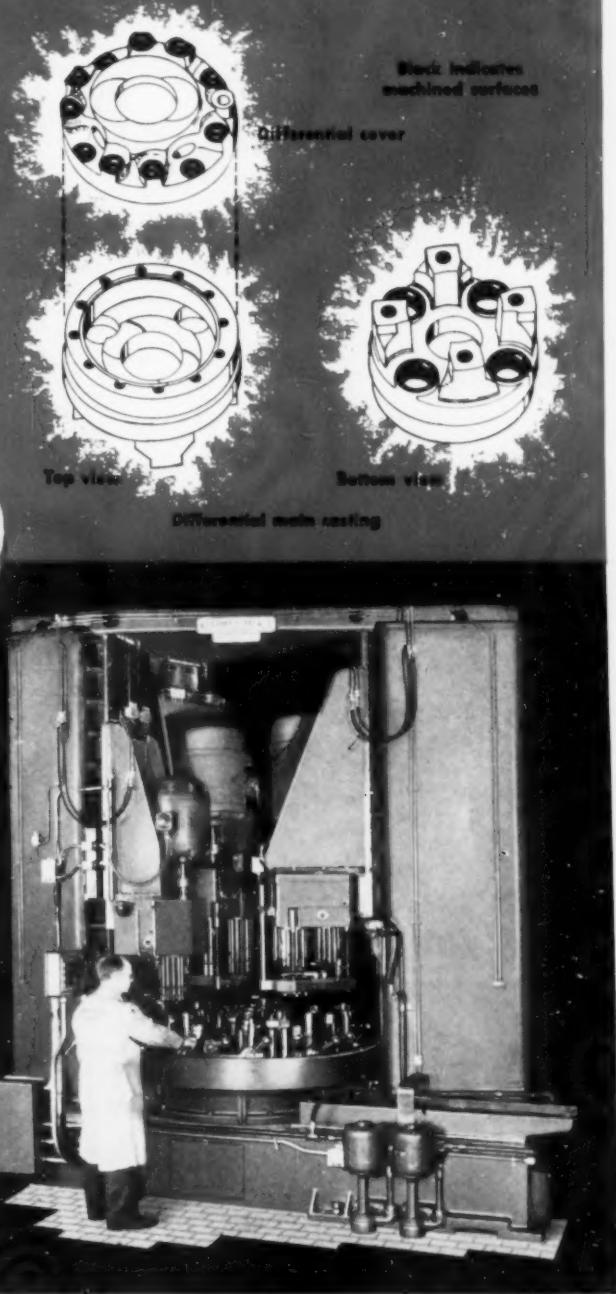
CUSTOMER SPECIFIED

Customer specified a multi-purpose production machine to perform 12 operations in sequence on both the main casting as well as the cover of a differential housing.

KEARNEY & TRECKER DESIGNED

Kearney & Trecker designed this new 88-spindle drilling and tapping machine to complete 134 pieces per hour, 67 covers and 67 main castings.

Machine features rugged columns which provide rigid support . . . and exacting accuracy. Five fixtures, each holding three workpieces, are mounted on a standard Kearney & Trecker 60" rotary index table. Machine employs three vertical drilling heads, each counterweighted. First head has 48 spindles and performs drilling, counterboring, flat bottom drilling and chamfering. Second head carries 28 spindles and handles spotfacing, reaming, boring and trepanning operations while head No. 3 with 12 spindles does tapping operations.



New production efficiency starts with Kearney & Trecker Milwaukee machine tools

This new machine proves that you can rely on Kearney & Trecker's Special Machinery Division to give you the highest production possible at lowest cost. Because with more than 50 years' experience in machine design and manufacture, Kearney & Trecker Corp. has all the ingenuity and skill required to solve high pro-

duction machining problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all the details. Contact him today!

For more details on the machine illustrated ask for Data Sheet No. 1052. Also, free booklet "Doorway to a proven method for solution of big and small metalworking problems" is yours for the asking.



Builders of Precision and Production Machine Tools Since 1898

FOR A *New Thrill* IN SHEARING . . .



Series No. 8D10 Shear for cutting steel plate up to $\frac{1}{2}'' \times 10'0''$

The electric foot switch is one of the many features that makes operation of Steelweld Shears easier and faster. It can be slid around the floor to wherever most convenient. Only a slight movement of the toe is required to operate it. This feature is standard on all Steelweld Shears, and is furnished at no extra cost.

TRY STEELWELD *Pivoted-Blade SHEARS*

REGARDLESS of what shears you have ever operated, in Steelweld Pivoted-Blade Shears a new thrill is in store for you.

Like a modern streamlined engine as compared to an old-time locomotive, or a luxury liner versus a tramp freighter, so will you find these new shears as compared to all power shears you have ever used before.

Here at last is something new in shearing history — a great advancement in design and performance

— the only truly basic change for many decades.

Not only are these new shears easier to operate but their design assures smooth straight cuts to hairline accuracy for years of operation. Their construction is extra heavy and all modern features are incorporated to provide for ease of operation, minimum maintenance and long life.

If you shear plate in any thickness to $1\frac{1}{4}$ -inch or length to 18 feet, you should get the facts on these new Steelweld Shears. Send for catalog today.



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CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

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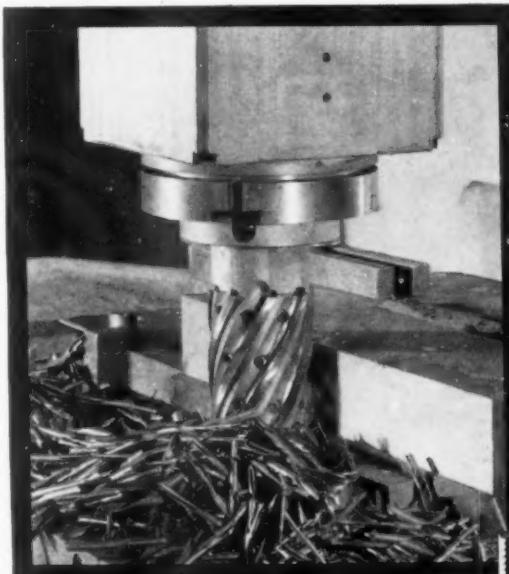
STEELWELD **SHEARS**

INGERSOLL

SOLID SHANK CUTTERS



Ingersoll 8" dia. NX Solid Shank Cutter takes a cut 5" wide and 2½" deep in a 350 Brinell steel die block.



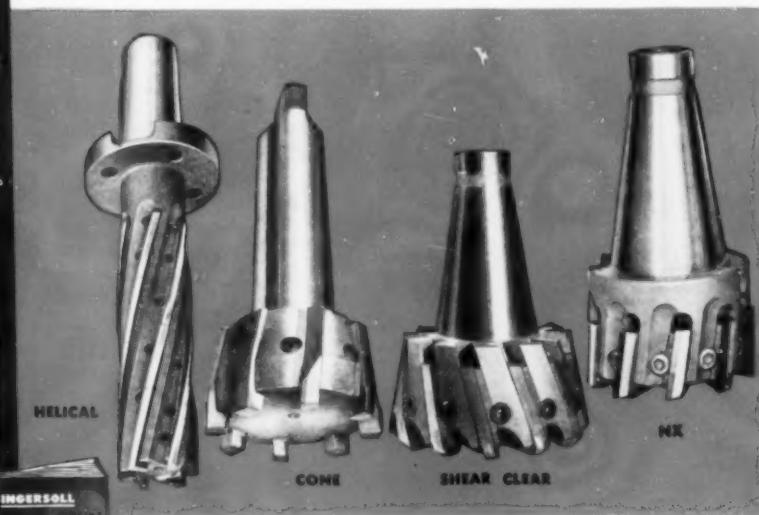
This 4½" dia. Solid Shank Helical Cutter removes ¼" of tough cast iron along a strip 4" wide, feeding 12" per minute.

These action pictures show the exceptional performance of Ingersoll Solid Shank Cutters in milling hard, tough metal.

Developed by Ingersoll, with 65 years of experience in building special machines and milling cutters, these Solid Shank Cutters are made to handle difficult operations better because:

- Eliminating the center bore gives greater integral strength and stability . . . increases the capacity to absorb and transmit cutting power.
- Greater rigidity means uniform cutting by all blades, increased accuracy, faster feed rates and better finish.
- Solid shank design makes available the economies of inserted blades, even in cutters as small as 2" in diameter.

Ingersoll cutter engineers are available to recommend standard cutting tools that are designed for your particular work and which will give you excellent milling results. All Ingersoll cutters are manufactured with carbide-tipped, cast alloy or high speed steel replaceable blades.



Write for Catalog 60F, describing Ingersoll inserted blade face mills, end mills, helical slab mills, side mills, arbor cutters, angular cutters and boring heads.

THE

INGERSOLL

MILLING MACHINE COMPANY
ROCKFORD, ILLINOIS, U. S. A.

BUILDERS OF SPECIAL DESIGN MILLING & BORING MACHINES
ORIGINATORS OF *SHEAR CLEAR* CUTTERS



Guaranteed Accuracy

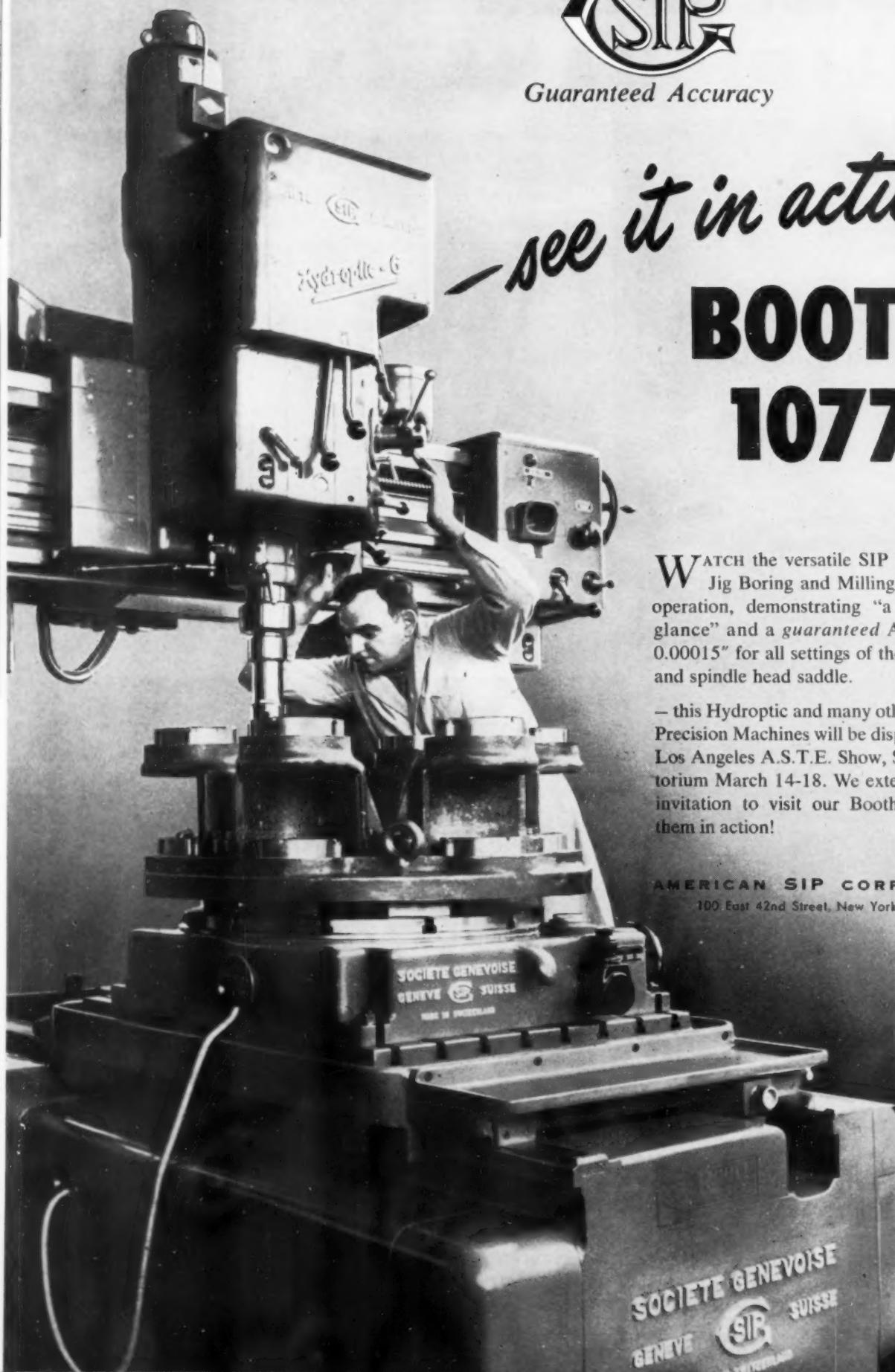
—see it in action

BOOTH 1077

WATCH the versatile SIP Hydroptic-6 Jig Boring and Milling Machine in operation, demonstrating "a tenth at a glance" and a *guaranteed Accuracy* of 0.00015" for all settings of the work table and spindle head saddle.

— this Hydroptic and many other SIP High Precision Machines will be displayed at the Los Angeles A.S.T.E. Show, Shrine Auditorium March 14-18. We extend a cordial invitation to visit our Booth — to watch them in action!

AMERICAN SIP CORPORATION
100 East 42nd Street, New York 17, N.Y.





VISIT BOOTH 950
WESTERN A.S.T.E.
EXPOSITION
LOS ANGELES
MARCH 14-18

NOT JUST BETTER - *but* Much Better!

Test the Dimensionair by the most rigid methods and you will see beyond all doubt that it has unparalleled accuracy and that it has many advantages beyond your expectations.

Put it in your plant — alongside any other air gage — and still more advantages will become definitely obvious.

Just setting it ready to gage is strikingly simple and fast — less than ten seconds — absolutely no fiddling around balancing air pressures.

It is the only dimensional air gage made to a definite predetermined accuracy. All critical dimensions are made precisely to specified tolerances to assure that accuracy. Every gage repeats the same measurements. It is the only air gage accurate enough to have a calibrated scale when set to one master. Its calibration is not left to the operator's adjustments but is built into the gage.

If you use old style air gages and are unfamiliar with the Dimensionair, you'll really appreciate its accuracy and ease of handling. If you will give yourself a break and really investigate the Dimensionair — and try it — you'll say, too, "There's no comparison". You will really like it.

Its eleven advantages positively justify the time you take to find out that these claims are not exaggerated. In quick, simple set up, speed of setting, gaging accuracy, stability and simple maintenance, the Dimensionair more than justifies its place in your production.

Don't take our word for it — or anybody's — take your own. Try it, buy it and use it. You'll insist that the next gage will be a Dimensionair, too. Just ask us for a chance to operate one.

FEDERAL PRODUCTS CORPORATION
5193 Eddy Street, Providence 1, R. I.

Ask **FEDERAL**
FOR ANYTHING IN MODERN GAGES ...

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automatically Controlling Dimensions on Machines

Automation

YESTERDAY ▶ TODAY ▶ TOMORROW

● We have been building automatic work handling and work transfer systems for over a quarter century. Lo-swing Automation Methods provide a means for production manufacturers to extend the automaticity of individual machines through a series of successive, though dissimilar, operations to combine work loading, machining, gaging, work transfer, and inspection into one single, automatically-controlled phase of the production flow. Let Seneca Falls engineers help solve your automation problems.

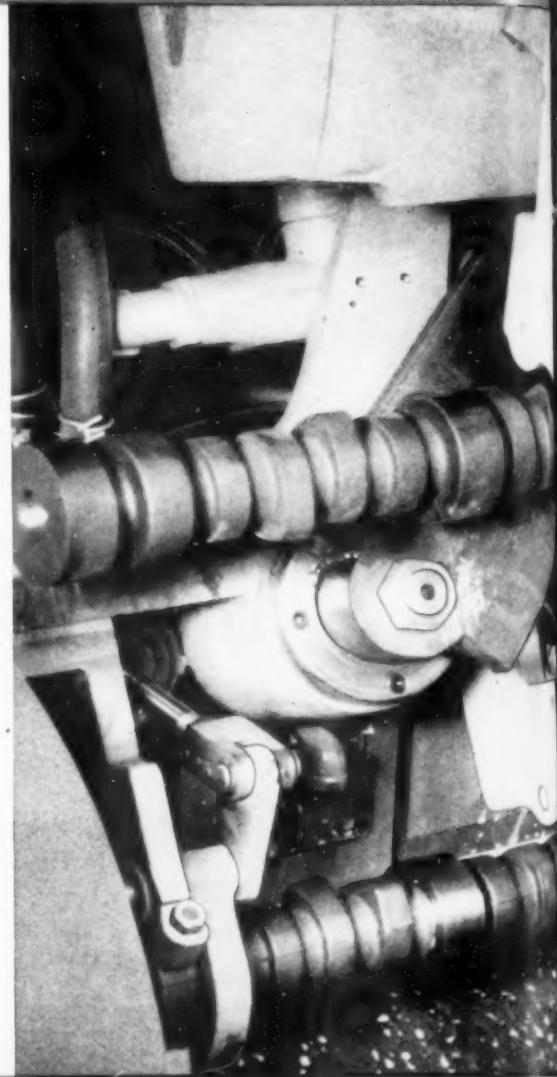
SENECA FALLS MACHINE CO.

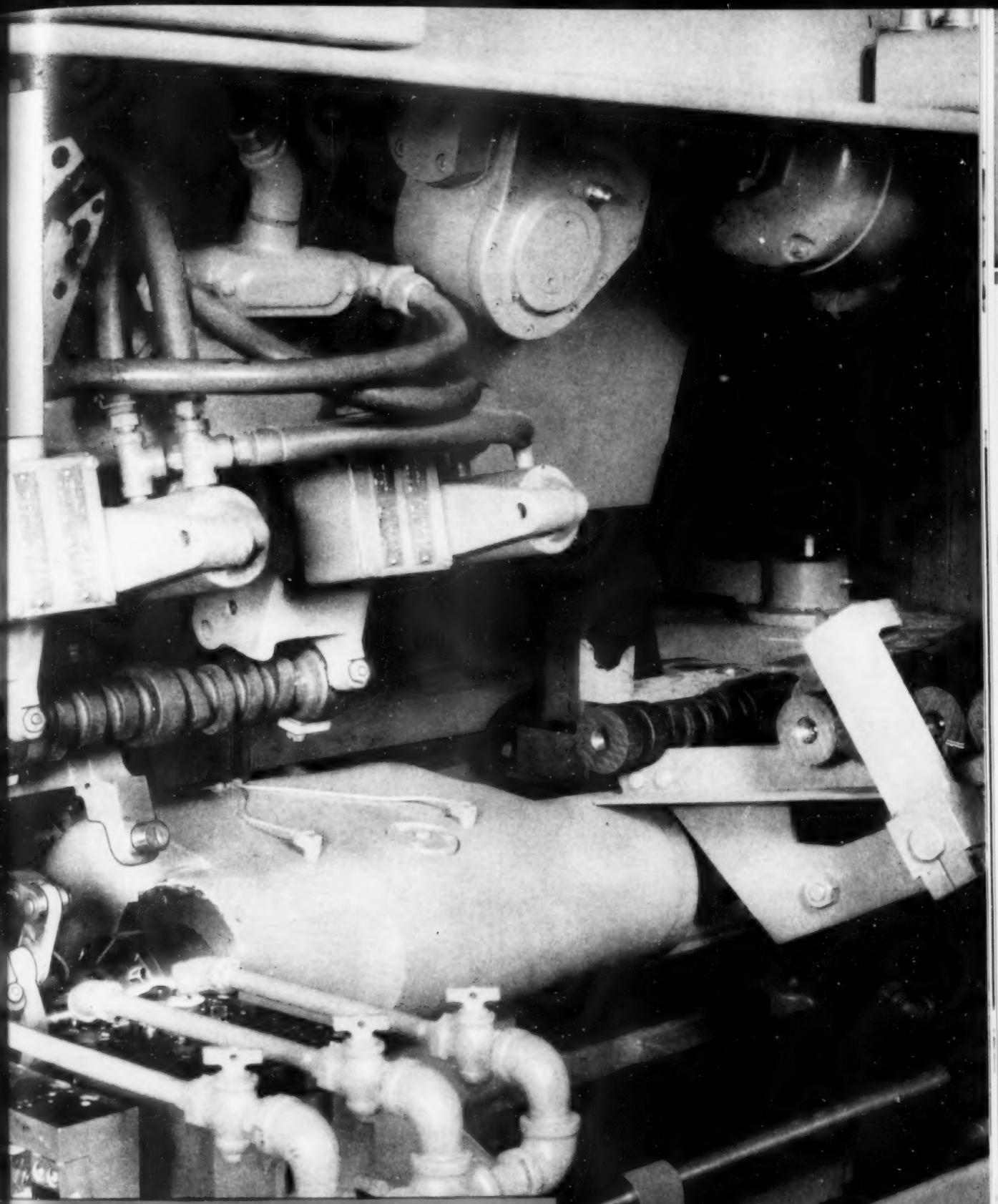
SENECA FALLS, N. Y.

The loader illustrated will handle any work that can be held between centers. Other loaders are designed for chuck work.

TODAY . . . ANY COST
THAT CAN BE "CUT" IS
TOO HIGH!

LOWER YOUR COSTS WITH





o-wing

USE LIGHTWEIGHT ANCHOR BUSHING DRILL TEMPLATES



STANDARD
REGULAR



NUT PLATE

Anchor Bushings for sheet metal drill templates.



CIRCLE



KNURLED



DIAMOND

Anchor Bushings for laminated plastic drill templates.

Lightweight sheet metal or plastic Anchor Bushing drill templates are easy to handle. You reduce worker fatigue and are able to use "off-the-floor" storage facilities.

Sheet metal Anchor Bushing drill templates weigh about one third the weight of conventional drill tooling. Depending on lamination thickness, plastic Anchor Bushing drill templates are similar in weight to sheet metal templates.

When compared to drill jigs or fixtures, additional Anchor Bushing benefits are realized in lower cost for materials and bushings and in less skilled help required to produce accurate drill tooling.

Easy-to-make drill tooling is described in the Anchor Bushing Catalog — write for it.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-296-1



Used in tight quarters, a sheet metal Anchor Bushing Drill template at Ryan Aeronautical Company, San Diego, California



hi-shear

RIVET TOOL COMPANY

8924 BELLANCA AVE., LOS ANGELES 45, CALIFORNIA

GAMMONS REAMERS *

Originators and Manufacturers of Helical Reamers and End Mills



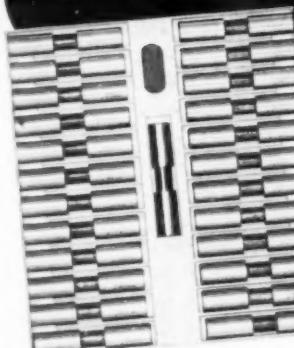
Helical Taper Pin Reamers Shipped by Return Mail

The
GAMMONS-HOAGLUND
Company

400 Main Street, Manchester, Conn.

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CLOSER TOLERANCES with DELTRONIC TENTH PLUG GAUGES



- ★ Size variation by ten thousandths
- ★ Set of 25 costs approximately same as Go and No-Go gauge.
- ★ Available in increments of $1/64$ " from $1/8$ " to 1"
- ★ Hardness is Rockwell C62/C64

This new system of precision gauging provides one gauge of nominal size plus 12 gauges of increasingly larger sizes in $.0001$ " increments and 12 gauges of decreasingly smaller sizes in increments of $.0001$ ". Each gauge is identified. It is the same size on both ends to double the life in usage.

For further information write Dept. D12.

DELTRONIC
CORPORATION

1507 RIVERSIDE DRIVE • LOS ANGELES 31, CALIF.

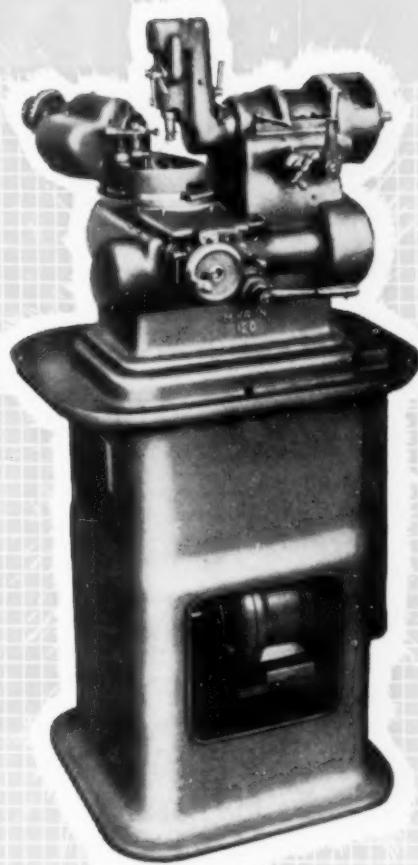
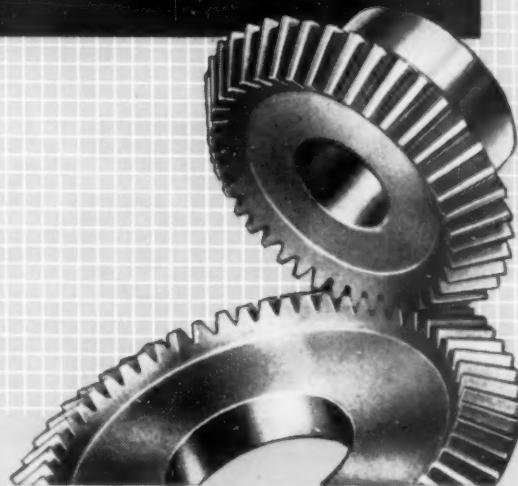
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THE **ULTIMATE**

IN

**BEVEL
GEAR
ACCURACY**



- low-cost tooling
- simplicity of set-up

NO. **120**
MIKRON

fine pitch
**BEVEL GEAR
HOBBING MACHINE**

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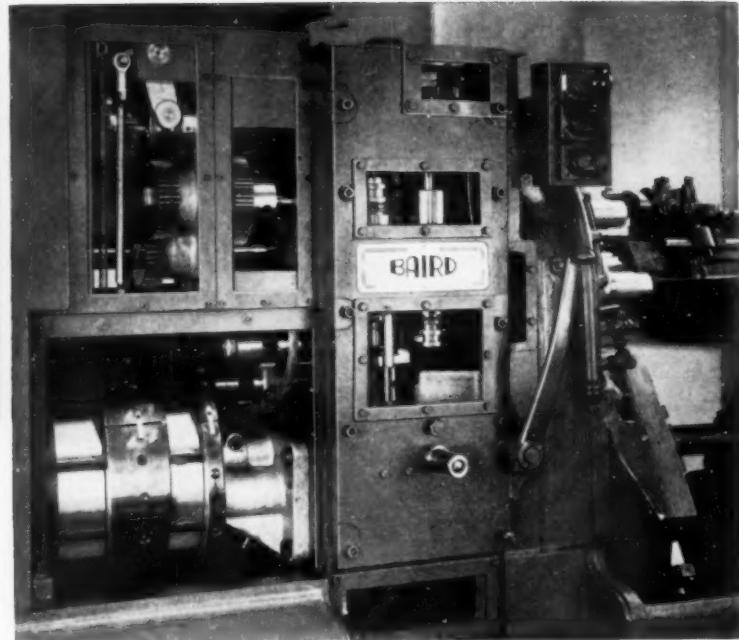
... IF IT'S A HIGH PRODUCTION PROBLEM ...

ASK



BAIRD

ABOUT IT



HERE'S BAIRD'S

Guinea Pig

WHERE WE WATCH OUR OPERATIONS...FOR YOUR BENEFIT

One of the features of Baird machines that customers like best is that when they are tooled and put on production . . . they produce. In many cases, however, arrival at that happy result in our customer's plant is by no means as simple as it sounds. Hence our "Guinea Pig" and other special Baird engineering procedures. The "Guinea Pig," as you can see from this photograph, is just that . . . a regular Baird Multiple Spindle Automatic, with plastic windows let into its "hide" at many vital points. By this means we can check details of operation under controlled conditions. Cams, gearing, controls, interlocks, tool slide action, temperatures, lubrication, wear . . . just about every factor in performance . . . is seen, gaged and compared.

And that, we believe, is typical of Baird's whole approach to high production machinery and tooling. For years, people have said "ASK BAIRD ABOUT IT" only because they know we will give them the right answer. Send in your inquiries, gentlemen — we're never too busy to help. Write Dept. TE.

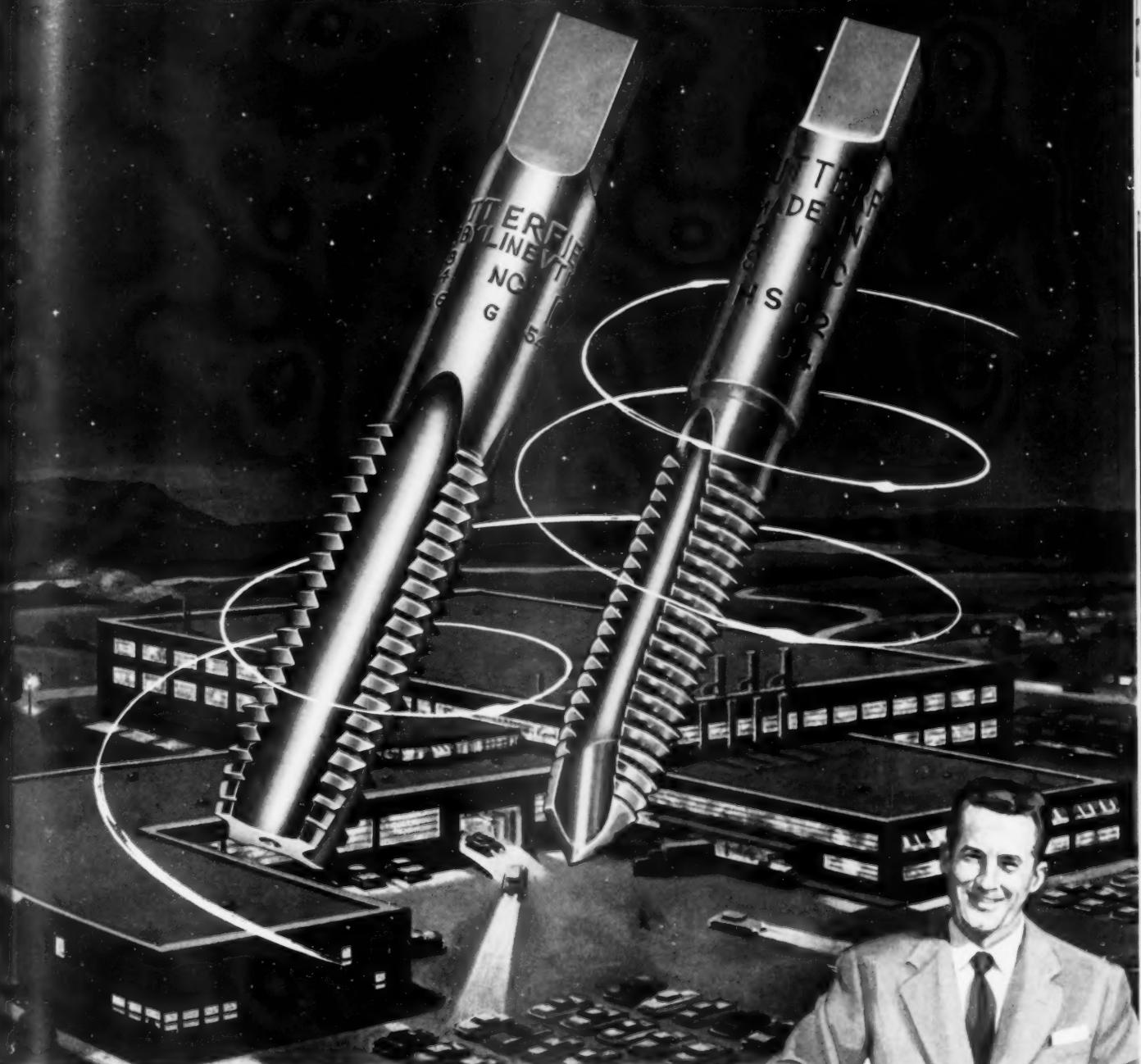
THE BAIRD MACHINE COMPANY
STRATFORD CONNECTICUT

WHERE YOU WILL GET THE HELP OF SPECIALISTS
ON THESE ESSENTIAL PRODUCTION PROBLEMS:

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL
FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

IBA 54

BUTTERFIELD



A COMPLETE LINE OF QUALITY cutting

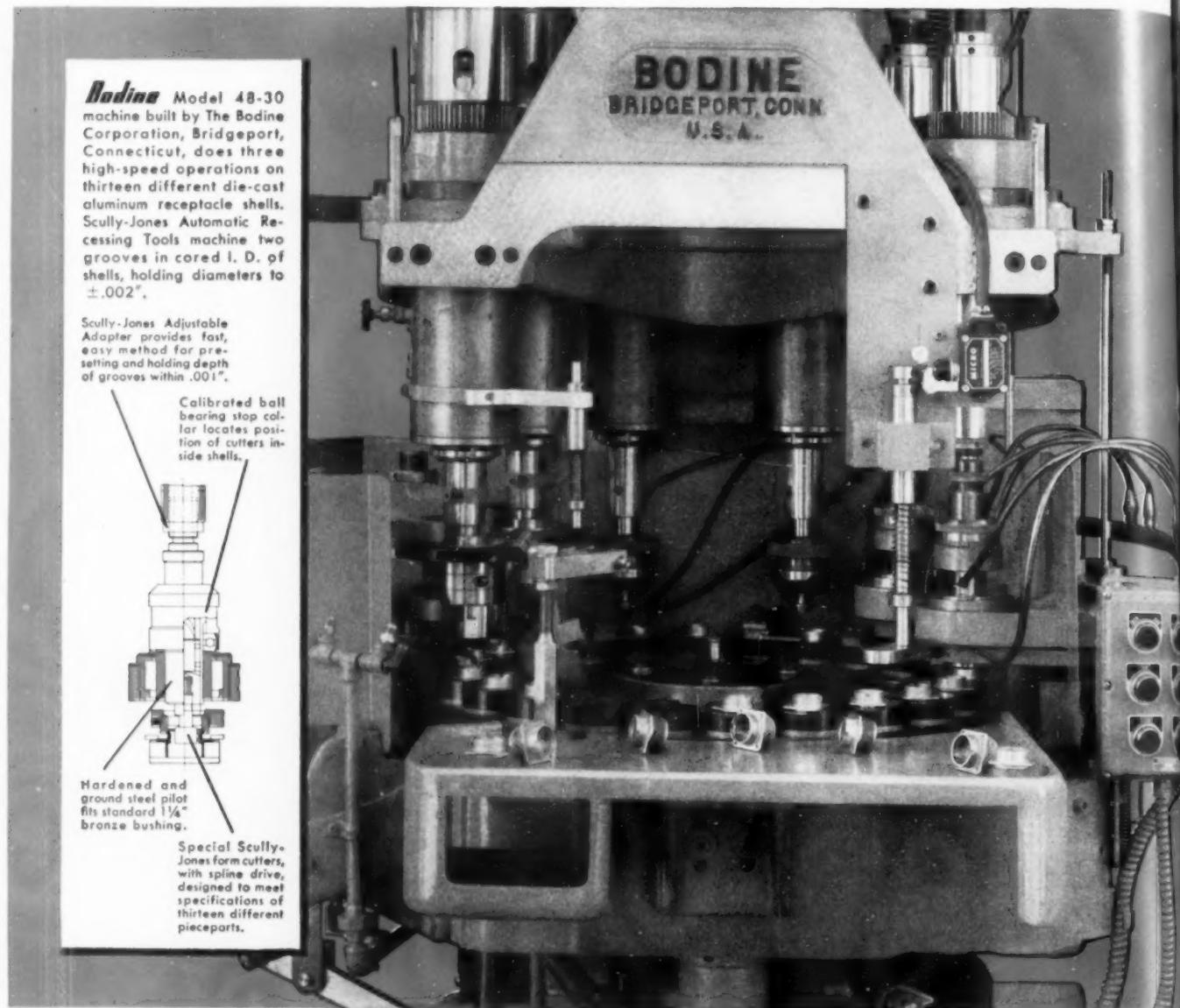
tools is now available from your Butterfield distributor. Taps are made to the same exacting standards as Butterfield Milling Cutters, Dies, Drills, Reamers, Counterbores and End mills.

UNION TWIST DRILL COMPANY
BUTTERFIELD DIVISION
DERBY LINE, VERMONT, U.S.A.

FOR FAST, ECONOMICAL SERVICE
CALL YOUR **BUTTERFIELD**
DISTRIBUTOR

**SCULLY
JONES**

Recessing Tools provide for internal grooving...



Bodine Model 48-30 "factory-equipped" with Scully-Jones Automatic Recessing Tools

Bodine dial-type machines are easily tooled for a variety of high speed operations, permitting special-purpose machine economies, with minimum capital investment. This "Model 48-30," for example, machines grooves, O.D., and threads of thirteen different receptacle shells at rates from 1600 to 2200 per 50-minute hour. Scully-Jones Type "J" and "C" Automatic Recessing Tools simplify intricate internal grooving operations and provide fast, accurate adjustments necessary for handling a wide range of work.

... versatile and low-cost method ... production, 1600 to 2200 per hour!



Scully-Jones Type "C"
Automatic Recessing Tool—
Types "J" and "C" pilot in a
fixture bushing. Type "R"
pilots in, and stops on work.

Want to do intricate, internal machining operations on standard drill presses, radial drills, turret lathes, or chucking machines . . . and reduce costs? You can get high production and hold close tolerances on your chamfering, grooving, relieving, back-facing, counterboring, necking, and boring operations using Scully-Jones Automatic Recessing Tools. In fact, by changing a tool bit holder or circular form cutter, a single recessing tool is easily and quickly adapted to do all, or a combination of these operations on standard machine tools!

Scully-Jones Recessing Tools reduce costs because many manual operations and skill requirements are eliminated. Positioning of the cutting tool and depth of cut are automatically controlled. Initial adjustments are simple, fast, and accurate. And properly adjusted, these low-cost tools will give you consistent accuracy and trouble-free performance on long run jobs.

Let your factory-trained Scully-Jones representative or distributor show you how automatic recessing tools can do many jobs well . . . at lower cost! Ask for Bulletin No. 10-50.

SCULLY
JONES

SCULLY-JONES

"Precision Holding" for holding precision

Scully-Jones and Company, 1915 S. Rockwell Street, Chicago 8, Illinois



**Micrometer
Grinding Fixture**

Provides accurate method for quickly sharpening and measuring circular form tools. Insert and use without need to cut-and-try. Bulletin No. 21-50.

**Compression Fixture
and Setting Gage**

These two new Scully-Jones fixtures provide quick, accurate method for pre-setting recessing tools for location and diameter of undercut.

Compression fixture holds recessing tool in position, frees operator for adjusting stop collars and using feeler gage. Feelor gage is made special to fit your specific job requirements. Bulletin No. 21-50.



Another Denison First.

THE MOST
VERSATILE
PUMP EVER
OFFERED



MULTIPUMP

VARIABLE VOLUME VANE PUMP

that gives you
variable volume at constant speed
PLUS **constant volume**
at variable speed

Never before has a hydraulic pump offered such flexibility in operation . . . at such savings in operating cost. A revolutionary idea in pump design, Denison MULTIPUMP heralds these new advancements of major benefit to all industry.

NEW, EXCLUSIVE MULTIPUMP PRINCIPLE makes possible great savings in horsepower . . . by delivering only the oil needed by the circuit.

SIMPLE, UNIVERSAL CONTROL is exceptionally flexible in operation...handles requirements of most hydraulic circuits *without additional controls*.

FINGER-TIP CONTROL. Simple hand dial adjusts volume. Volume is maintained by MULTIPUMP regardless of variations in pressure and pump speed.

and in addition . . .

PRESSURE COMPENSATED, easily adjusted. Can be remotely controlled. Can be vented.

RUGGED, DEPENDABLE. Denison design uses exclusive fully-balanced vane construction.

COMPACT. Takes less space . . . weighs less than other variable volume pumps of equal capacity.

OPERATES COOLER. New Denison design principle circulates oil from tank at all discharge rates, even when pump is compensated.

3 STANDARD SIZES*. Adjustable flow up to:

5 gpm — 15 gpm — 25 gpm at 1200 rpm
7½ gpm — 22½ gpm — 37½ gpm at 1800 rpm

Maximum continuous working pressure...1000 psi

* Other sizes available on special order.

SEND FOR FACTS

Operating characteristics, sizes and capacities of Denison MULTIPUMP are given in Bulletin 190. Write



THE DENISON ENGINEERING COMPANY

1182 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS

MORE TO COME

Watch for announcements on other new Denison developments.

A pump for pressures over 5000 psi soon to be announced by Denison.



DENISON
HydrOliCs



WELL CHOSEN FOR THE JOB!

PIP pins provide the Southern California Edison Company with the perfect answer for a fast, safe way to set up and dismantle sectional derrick booms for pole-setting and other heavy duty field operations.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-304-1

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



Patents Pending

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



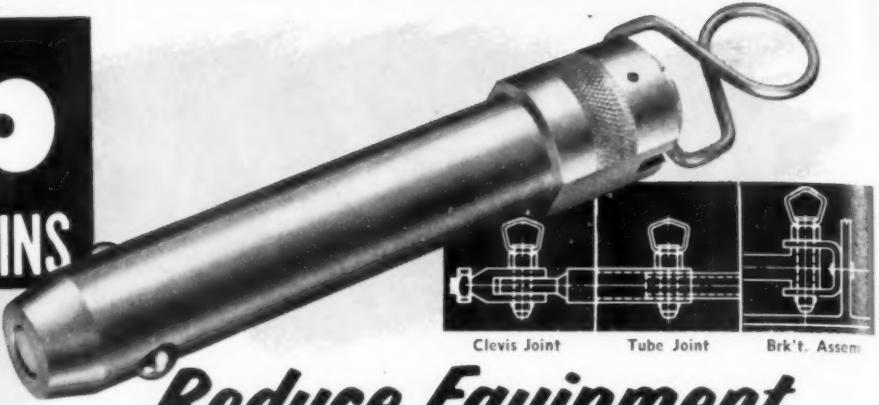
The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, 1/4, 5/16, 7/16, 1/2, 5/8, 3/4, 1"

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The patented push-to-insert, pull-to-remove principle of PIP double acting pins provides quick release and positive self-locking safety in a single unit. No cotter pins, nuts, bolts or other separate retaining items or assembly tools are required or need enter into your design specifications!

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PRECISION CIRCULAR CUTTERS



MEYCO carbide tipped and solid carbide cutters have earned an enviable reputation in plants where long tool life and precision workmanship is a MUST.

These cutters can be furnished in various diameters and thicknesses to meet the requirements of individual applications.

Saws and cutters, both carbide tipped and solid carbide, will aid production and precision in your slotting, venting, slitting and grooving operations . . . and they will be manufactured to your specifications. Please furnish complete specs and quantities desired when requesting prices and indicate material to be cut. MEYCO experience in the manufacture of precision tools, since 1888, is at your disposal. Write for Bulletin No. 52



W. F. MEYERS CO., INC., BEDFORD, INDIANA

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from interchangeable parts...

Danly Die Set Service is Faster!



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One of the main reasons for Danly's faster die set service is the *interchangeability* of die set parts achieved by Danly. It starts at the main Danly Plant where die set components are produced to Danly's traditional high quality, precision standards. The faster service cycle continues at all of the Danly Branch Plants where thousands of *interchangeable* die set components are stocked. The cycle is completed at the Danly Branch in your area where these parts are assembled as a die set to meet your specific requirements and shipped as soon as your order is received. So remember—for the best in die sets in the shortest time, the place to call is your local Danly Branch.



DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
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...to finished die sets



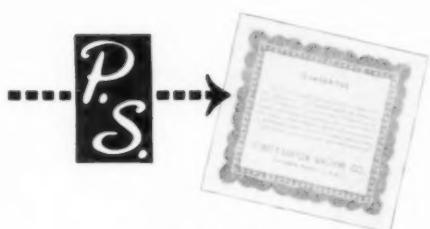
What was your chaser cost last year?

Check your figures . . . the total may surprise you.

Jones & Lamson Dies and Chasers will reduce these costs.

Our system of "no approximations" insures at least 20 controlled resharpenings with every set of tangent chasers . . . and you get the fastest job changeover of any tangent die . . . *without* extra equipment. You change only the chasers . . . not the holders.

Each set of J&L chasers is engineered specifically to do each job in the most economical way.



Only J&L chasers carry a *written* Guarantee of Class III or better — not sometimes, but *everytime*.

JONES & LAMSON

JONES & LAMSON MACHINE CO., 518 Clinton St., Dept. 710, Springfield, Vt., U.S.A.



THREAD TOOL DIV.

Machine Tool Craftsmen
Since 1835



UDDEHOLM STOCKS THE TOOLMAKER'S STANDBY

SAE/JIC-01 (Carbon .90%, Manganese 1.20%, Silicon .25%, Chromium .50%, Tungsten .50%, Vanadium .20%) is a time-tested, oil-hardening, non-deforming analysis for general tool and die work. Uddeholm calls it UHB-46. It is available from stock in all the forms illustrated:

1. UHB-46 drill rods
2. UHB-46 flat ground stock
3. UHB-46 hot-rolled bars
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And, we will deliver UHB-46 in special forgings.

With such a wide variety of sizes, shapes, and finishes, you can make all heat-treated components of a tool or die from one analysis and get them all from one source—Uddeholm. From

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Furthermore, you can get many other grades of tool and die steels. The most generally used types, in an extremely wide range of sizes and shapes, are always on hand. Stocks are carried in New York, Cleveland, and Los Angeles.

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Please send me _____ tool steel stock lists.

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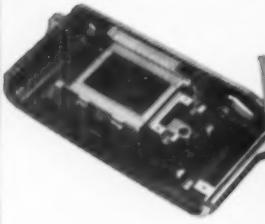
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UDDEHOLM COMPANY OF AMERICA, INC.

Tool and Die Steels
Specialty Strip Steels

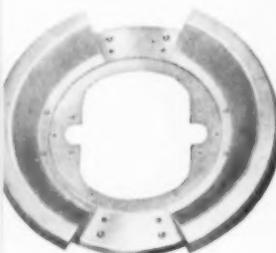
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Cleveland: 3756 Carnegie Avenue, Henderson 1-7440
Los Angeles: 5037 Telegraph Road, Angelus 2-5121



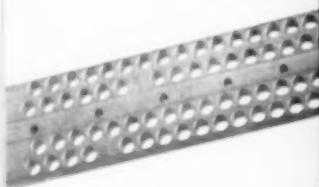
In Plastics



In Aluminum



In Cast Iron



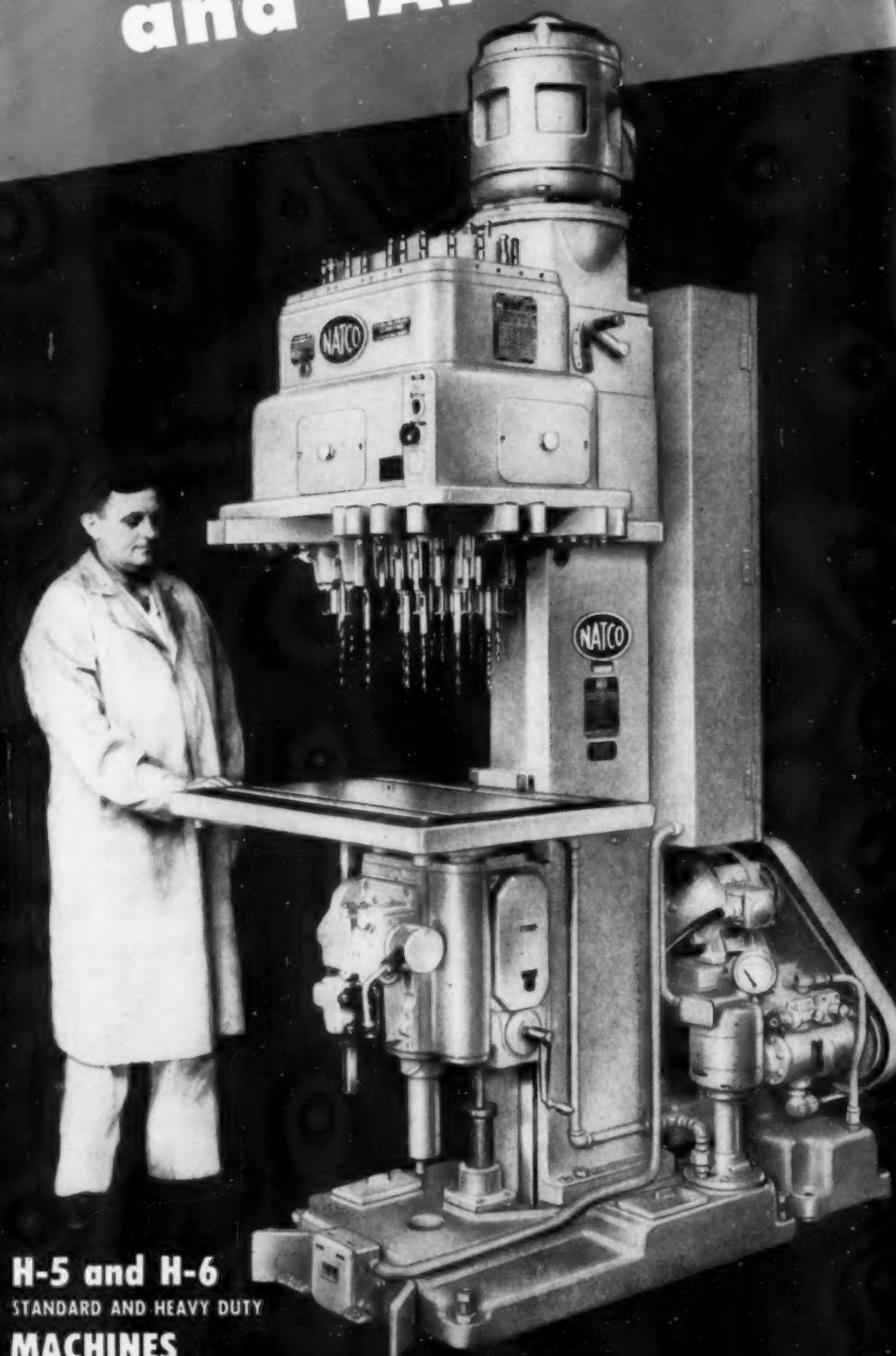
In Wood



In Steel

NATCO

HIGH SPEED, SENSITIVE
MULTI-DRILLERS
and **TAPPERS**



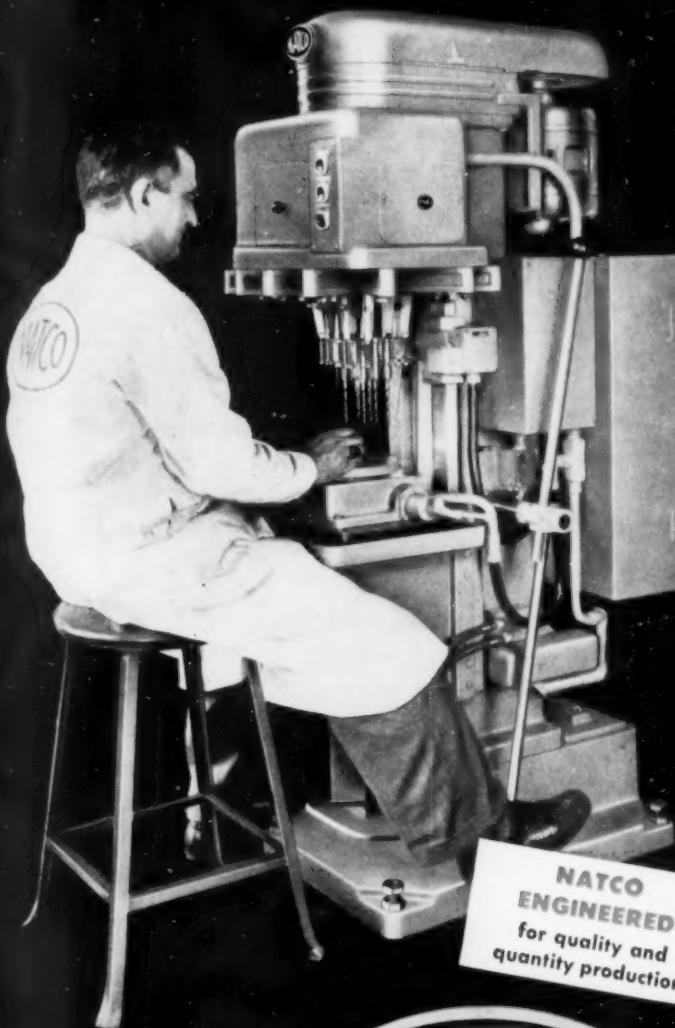
H-5 and H-6
STANDARD AND HEAVY DUTY
MACHINES
(H-6 Machine Illustrated)

...REDUCE COSTS WITH INCREASED PRODUCTION OF SMALL PARTS!

The NATCO Model B-33 light, sensitive multi-drilling and tapping machine shown at right is available in three feed arrangements: hand and foot feed or combination hand and foot and air-oil feed; and air feed. These machines have adjustable spindle arrangement for different work set-ups and a large working table. They offer maximum production on light work where super-sensitive operations and high speed are important.

NATCO H-5 and H-6 high speed sensitive multi-drillers and tappers are furnished in standard and heavy-duty models with adjustable multi-spindle, fixed center spindle or slip spindle type heads. They are provided with change gears and quick change speed mechanism for correct spindle speeds. They will efficiently handle a wide range of small and medium-sized work and make possible multiple drilling or tapping of small holes at minimum cost.

B-33
LIGHT, SENSITIVE
MACHINE



Call a Natco Field Engineer

to help you solve your problems in
Drilling, Boring, Facing and Tapping

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

CHICAGO, Room 203, 6429 W. North Ave., Oak Park • DETROIT, 10138 W. McNichols Rd.
BUFFALO, 1807 Elmwood Ave. • NEW YORK, 35 Beechwood Ave., Mount Vernon

The New GLENLOK Adjustable Adapter NUT Has a Floating Lock* That Can't Break Off



This new nut eliminates broken sections sometimes referred to as fingers. It has been tested on production in one of the big three auto plants for over a year and is now being made available to industry for the first time.

Hardened and Ground

These nuts are heat treated and then ground so they are always accurate by thousandths of an inch wherever set. This Glenlok Nut is the new standard adopted by Glenzer for use on Adapters, Floating Holders and all tools using National Acme Threads. This nut locks over milled drift slots or old style Adapters with milled set screw flats.

Reduces Down-Time

Ideal for quick tool changes on multiple spindle machines.

You'll find GLENLOK nuts efficient, economical.

Write for new Catalog Sheet Bb & Prices

THE J. C. GLENZER CO., Inc.
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USE READER SERVICE CARD; INDICATE A-3-310-1

RUST-LICK

WATER SOLUBLE - NON-FLAMMABLE - RUST PREVENTIVE

FOR EFFECTIVE GRINDING OF CARBIDE TOOLS

The use of RUST-LICK "B" and water will increase DIAMOND WHEEL life—eliminate fire hazards, rancidity, dermatitis and rust.

Currently used by leading manufacturers of Carbide Tools.

Write for free sample and brochure.

PRODUCTION SPECIALTIES, INC.
735 BOYLSTON ST., BOSTON 16, MASS.

USE READER SERVICE CARD; INDICATE A-3-310-2

America's Newest and BEST! TAPER SHANK KEYSEAT CUTTER

- * MADE TO OUT PERFORM ALL OTHERS
- * COMPETITIVELY PRICED



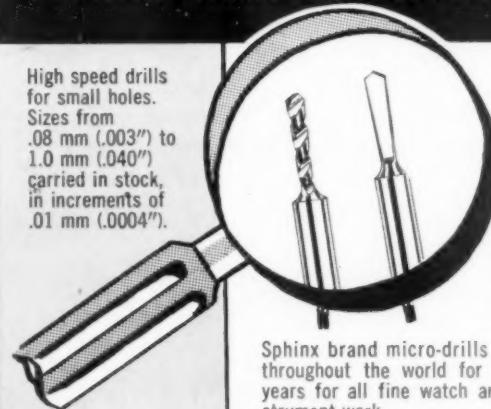
Keyseat Cutter
Specialists for 33 Years

QUALITY TOOL WORKS
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USE READER SERVICE CARD; INDICATE A-3-310-3

"IN-STOCK" SERVICE ON FAMOUS SPHINX BRAND MICRO-DRILLS

High speed drills
for small holes.
Sizes from
.08 mm (.003") to
1.0 mm (.040")
carried in stock,
in increments of
.01 mm (.0004").



Sphinx brand micro-drills used throughout the world for many years for all fine watch and instrument work.

Send for Bulletin N
listing sizes and prices
of stock drill sizes and
micro-drilling equipment.

These precision drills are available in two styles, flat pivot drills or spiral fluted drills. They are made with concentric oversize shanks. Because of their rigidity they are especially useful in all types of drilling equipment.

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Louis Levin & Son, Inc.

3610 South Broadway • Los Angeles 7, California

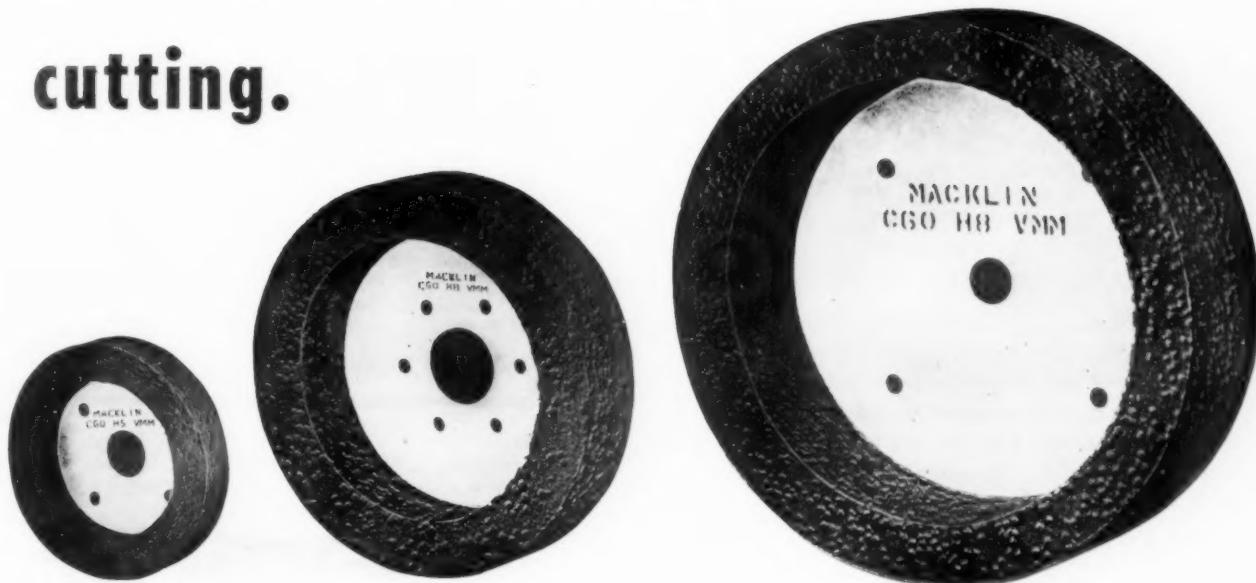
USE READER SERVICE CARD; INDICATE A-3-310-4

Hats Off  to the

MACKLIN M.M.

—modern miracle,—grinding wheel.

It's *tops* for carbide cutting.



MACKLIN M.M. Wheels, setting entirely new standards in performance and results, have been adopted by some of the largest users of carbide tools.

The unorthodox appearance is caused by inclusions of fine abrasive in pellet form, which act as a secondary or complementary grinding medium.

This radically new wheel is gaining more and more new users by reducing grinding costs, giving better finishes and by its over-all superior performance.

Many users assert wheel life has been increased 300%, with reduced labor cost. Others report faster stock removal, with finishing costs reduced up to 50%.

Call your Macklin Distributor today!

There is a **MACKLIN** Field Engineer in your vicinity. **MACKLIN** distributors are located in all principal cities, with ample stocks to fill your needs.

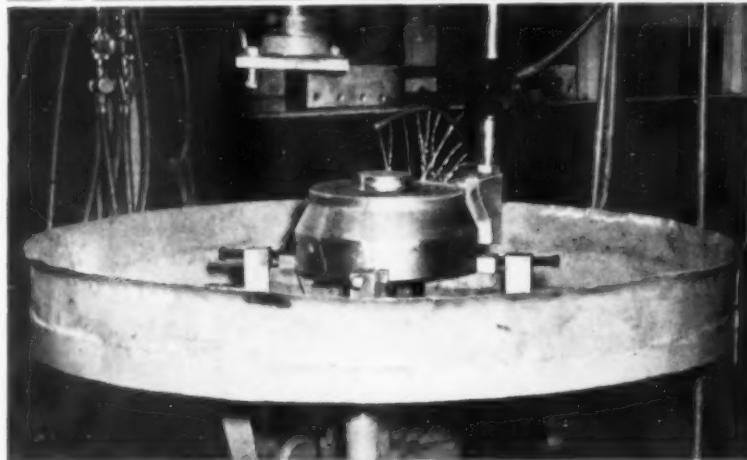
Write for complete information to Dept. 32

MACKLIN COMPANY
Manufacturers of GRINDING WHEELS AND OTHER ABRASIVE PRODUCTS
JACKSON, MICHIGAN





The MEEHANITE® Casting Report



Builder says:

"In producing parts for jet engine combustion systems, we have found that flame hardened Meehanite metal dies are far superior to those made from ordinary gray iron castings when used on hydraulic or mechanical presses.

The rings and punches made from flame hardened Meehanite metal for use on our Cincinnati Hydroform Presses are equal in performance to those made from far more costly materials.

For further improvement and to avoid scores and scratches during drawing operations, it is found beneficial to hard chrome plate the work surfaces of the die, but it is important that the die is hardened before plating to reduce peeling or chipping of the chrome to a minimum."

J & B "PANTO-MILLER"

Another Precision Tool Specifying Meehanite Components

Johnson & Bassett, Inc., Worcester, Massachusetts, build a 2-dimensional pantograph engraver known as the "Panto-Miller". Designed for versatility, precision and efficient production, this unit incorporates Meehanite castings for all major, vital parts.

Builder says:

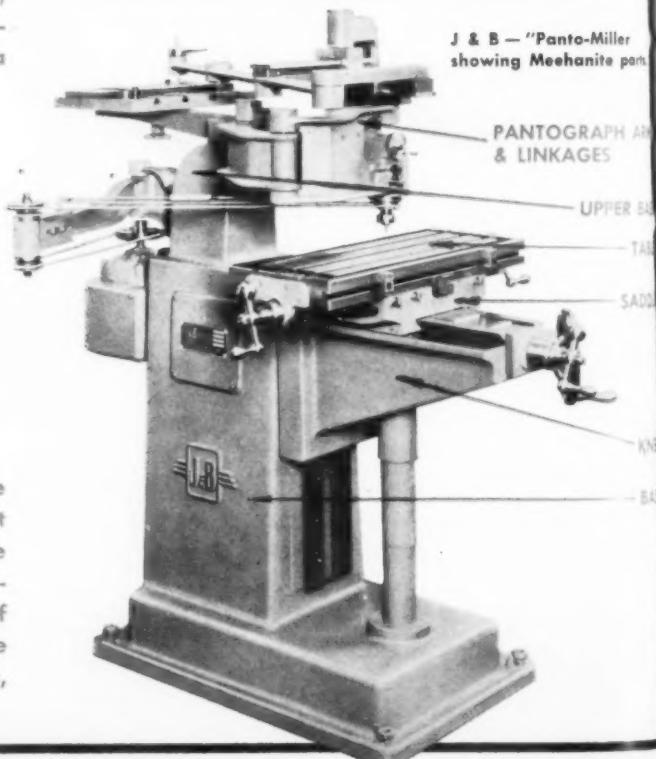
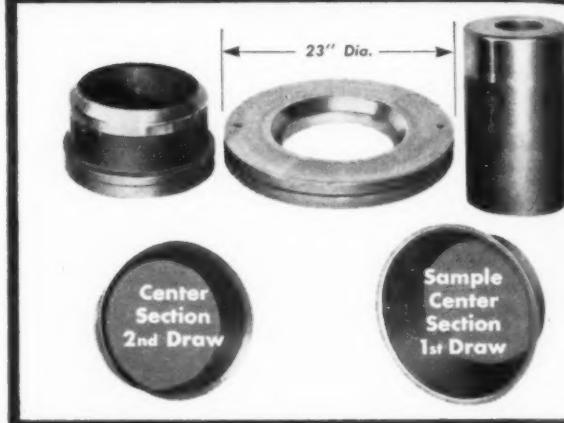
"Our use of Meehanite castings in general is due to the excellent machinability, tensile strength and rigidity. It is important to our Panto-Miller that we have these three features, plus the important feature of vibration absorption. Our machine is a duplicating machine and, of course, must be extremely accurate and we require the best materials available as insurance against blow holes, distortion, etc."

FLAME HARDENED MEEHANITE DIES PRODUCE JET ENGINE PARTS

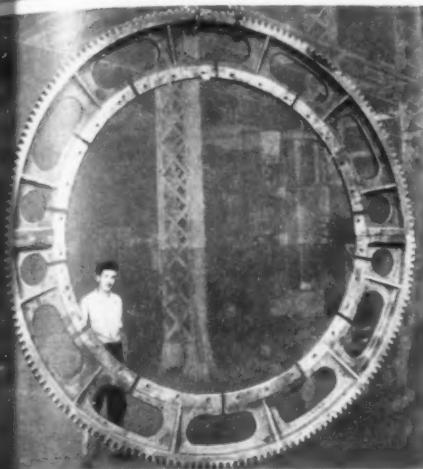
Cockshutt Aircraft Limited, Renfrew, Ontario manufacturers of jet engine components, have found the use of flame hardened Meehanite dies are the all-round answer to better performance in service in the production of pressed parts, a superior finished product.

Flame hardening set-up for hardening Meehanite dies prior to chrome plating.

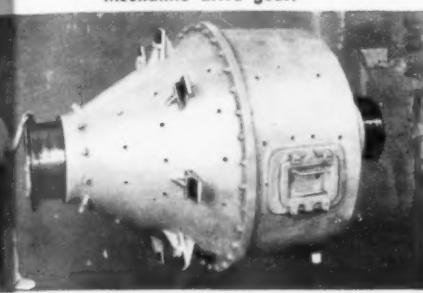
Meehanite punch-draw and pressure rings; chrome-plated for second draw on 600-ton Dominion Hydraulic Press. Flame tube center section.



Industries report what Meehanite Castings have done for them



Meehanite drive gear.



Meehanite grinding mill shell.

RUGGED HARDINGE GRINDING MILLS BUILT WITH MEEHANITE CASTINGS

The name "Hardinge" has long been famous in those fields where the grinding or pulverizing of all types of materials is a basic requirement. As manufacturers of the highly successful Conical Grinding Mill, the Hardinge Manufacturing Company, York, Pennsylvania, materials specifications call for maximum properties and service life and Meehanite castings are used for important basic components. These include:

1. Mill Shell • 2. Trunnions • 3. Gear Ring and Gear • Main Bearings

Builder says: "We undertook the manufacture of Meehanite castings in our foundry some years ago, not only as a means of improving foundry efficiency and quality of castings, but in order to produce cast components such as these which will provide maximum wear resistance, high strength and toughness and the uniformity of these properties which enables us to assure our customers that they are buying a better product when they buy from Hardinge."



Mill bearings are Meehanite castings.

ONLY A MEEHANITE FOUNDRY CAN MAKE MEEHANITE CASTINGS

The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington and Dover, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, Ohio
Builders Iron Foundry	Providence, Rhode Island
Compton Foundry	Compton, California
Continental Gin Co.	Birmingham, Alabama
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
Crawford & Doherty Foundry Co.	Portland, Oregon
D-Laval Steam Turbine Co.	Trenton, New Jersey
M. H. Detrick Co.	Newark, N. J. and Peoria, Illinois
Empire Pattern & Foundry Co.	Tulsa, Oklahoma
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Georgia Iron Works Co.	Augusta, Georgia
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Hardinge Company, Inc.	New York, New York
Hardinge Manufacturing Co.	York, Pennsylvania

Johnstone Foundries, Inc.	Grove City, Pennsylvania
Koehring Co.	Milwaukee, Wisconsin
Lincoln Foundry Corp.	Los Angeles, California
Palmyra Foundry Co., Inc.	Palmyra, New Jersey
The Henry Perkins Co.	Bridgewater, Massachusetts
Pohlman Foundry Co., Inc.	Buffalo, New York
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
Ross-Meehan Foundries	Chattanooga, Tennessee
Shenango-Penn Mold Co.	Dover, Ohio
Sonith Industries, Inc.	Indianapolis, Indiana
Standard Foundry Co.	Worcester, Massachusetts
The Stearns-Roger Manufacturing Co.	Denver, Colorado
Taylor Engineering & Mfg. Co.	Allentown, Pennsylvania
Valley Iron Works, Inc.	St. Paul, Minnesota
Vulcan Foundry Company	Oakland, California
Washington Iron Works	Seattle, Washington

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Write for your copy of "The Handbook of Meehanite Metals"

This Advertisement Sponsored by Foundries listed above

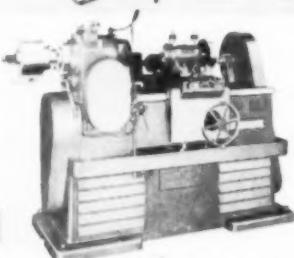
MEEHANITE METAL CORP.

714 North Ave., New Rochelle, N. Y.



CUT PRECISION THREADS FASTER with these 3 COULTER AUTOMATICS!

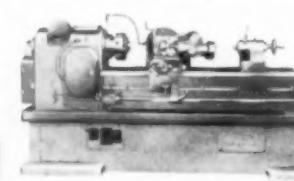
Whenever you use a Coulter, you'll see production figures skyrocket... production costs plummet. Try any one of these Coulter Automatic Threading Machines — and you'll want all three:



"H1" Hob Thread Milling Machine cuts precision, internal and external threads... AUTOMATICALLY.



"L1" Threading Lathe cuts precision, square, standard and 29 degree threads... AUTOMATICALLY.



"Threadmaster" Thread Milling Machine cuts precision, long and short traversing, elevating, cross feed and lead screws... AUTOMATICALLY.

Without obligation, consult our engineering staff with your specific threading problems. Catalog and machine specifications available upon request.

MACHINE TOOL BUILDERS SINCE 1896

The *Coulter Machine Co.*

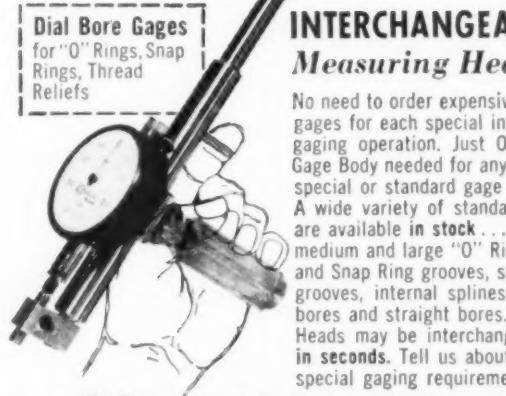
645 Railroad Ave. Bridgeport 5, Conn.

USE READER SERVICE CARD; INDICATE A-3-314-1

100 HEADS

...only ONE body

Dial Bore Gages
for "O" Rings, Snap
Rings, Thread
Reliefs



INTERCHANGEABLE Measuring Heads

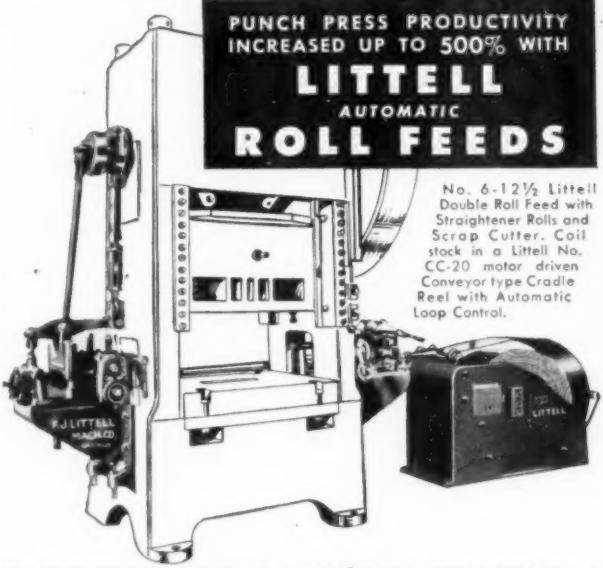
No need to order expensive new gages for each special internal gaging operation. Just One RIMAT Gage Body needed for any number of special or standard gage heads. A wide variety of standard heads are available in stock... for small, medium and large "O" Ring and Snap Ring grooves, special grooves, internal splines, counterbores and straight bores. Heads may be interchanged in seconds. Tell us about your special gaging requirement!!

RIMAT

TOOL COMPANY

DEPT. TE-3 • 21 DAYTON ST.
PASADENA 2, CALIFORNIA

USE READER SERVICE CARD; INDICATE A-3-314-2



PUNCH PRESS PRODUCTIVITY
INCREASED UP TO 500% WITH

LITTELL
AUTOMATIC
ROLL FEEDS

No. 6-12½ Littell
Double Roll Feed with
Straightener Rolls and
Scrap Cutter. Coil
stock in a Littell No.
CC-20 motor driven
Conveyor type Cradle
Reel with Automatic
Loop Control.

Production per press increases up to 500% when automatic feeding with Littell Roll Feeds replaces hand feeding. The savings in handling and storage of coil stock added to the economies of faster production produce an automation dividend. Littell Roll Feeds in a wide range of sizes and models handle stock up to .156" maximum thickness and up to 72" maximum width at speeds of 50 to 250 strokes per minute. Lengths fed per stroke range up to 50". Standard Littell Automatic Feeds serve all types and sizes of presses.

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F.J.
LITTELL
MACHINE
CO.

ROLL FEEDS • DIAL FEEDS
STRAIGHTENING MACHINES
REELS • AIR BLAST VALVES
District Offices Detroit, Cleveland

Speed
with Safety
4199 N. RAVENSWOOD AVE., CHICAGO 13, ILL.
USE READER SERVICE CARD; INDICATE A-3-314-3

Finest Made!

ATKINS
SILVER STEEL
TUNGSTEN

614 P
HIGH SPEED
MADE IN U.S.A.

...and made only by-

ATKINS

• PRECISION GROUND FLAT STOCK

• POWER AND HAND HACKSAW BLADES

• METAL CUTTING BAND SAWS

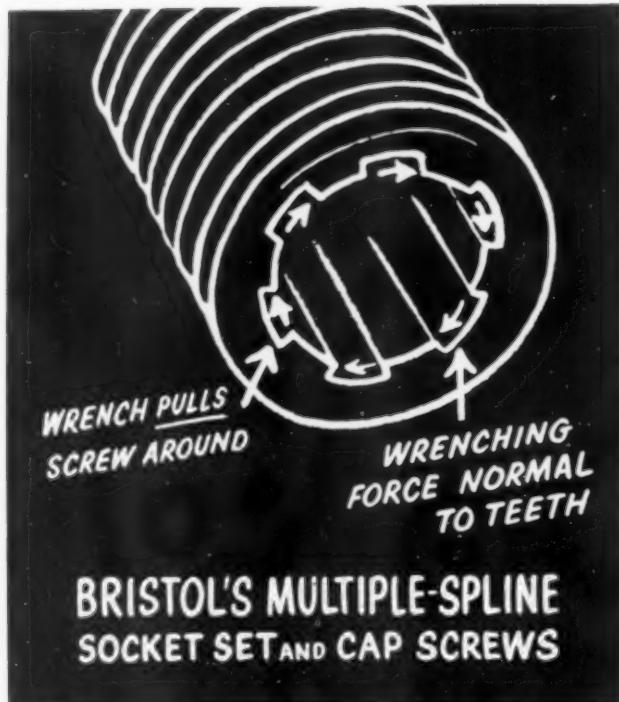
• CIRCULAR METAL SAWS • FILES

• SEGMENTAL METAL SAWS • CARBIDE TIP SAWS



ATKINS SAW DIVISION

BORG-WARNER CORPORATION
INDIANAPOLIS 9, INDIANA



SEE HOW GEAR-LIKE TEETH in Multiple-Spline Socket enable wrench to pull screw around. No expanding pressure—all wrenching force is translated into rotary motion. Result: faster assembly, tighter wrenching for greater holding power. Bristol's Multiple-Spline Socket Screws can be wrenches thousands of times and never break or round out at high torque.

BETTER TWIST in socket screws — from elementary engineering principle

We're talking about the multiple-spline — you probably discussed it in your first year at engineering school.

It was this age-old principle, recognized as one of the best means of transmitting rotary power (used on automobile drive shafts, rear axles and airplane propeller hubs, for example), that Bristol's design engineers thought of when they set out to build a better socket screw.

Here's what they discovered: internally splining the socket of an ordinary socket screw produced a screw that would never split or round out, yet have more "wrenchability" and hold tighter than any other screw.

That's the story behind the Bristol Multiple-Spline Socket Screw — now used wherever shock and severe vibration exist . . . wherever a better socket screw is needed.

If you're not already familiar with these extra-strong fasteners, we'll be glad to mail samples to you. Tell us the size and type you want (Bristol's Multiple-Spline Socket Screws are made in sizes from No. 0 wire to $\frac{1}{2}$ inch—cap and set).

A.4.12

BRISTOL'S SOCKET SCREWS



THE BRISTOL COMPANY, Socket Screw Division, Waterbury 20, Conn.

COME SEE US IN BOOTH 458 AT THE 23RD A.S.T.E. CONVENTION
USE READER SERVICE CARD; INDICATE A-3-316-1

Practical . . . BECAUSE IT'S A TIME-SAVER



Types to fit
any machine
used for
tapping or
reaming.

In making set-ups for tapping and reaming, you'll find it more practical to use a Ziegler Floating Tool Holder than an ordinary tool holder—for a very simple reason.

With ordinary tool holders a high degree of accuracy is necessary in aligning the work with the spindle—a time-consuming operation. But, with the Ziegler all that you have to do is to come within $1/32"$ of center on the radius ($1/16"$ on the diameter) and the holder automatically compensates for the difference.

Try a Ziegler on your next tapping or reaming job and see if you don't find it the most practical tool holder you have ever used.
PROMPT DELIVERY.

W. M. ZIEGLER TOOL COMPANY
13574 AUBURN DETROIT 23, MICH.

• WRITE FOR CATALOG •

Ziegler
ROLLER DRIVE **FLOATING HOLDER**
for Taps and Reamers...

USE READER SERVICE CARD; INDICATE A-3-316-2

Commander LEAD-MATIC Tapper

Automatic Tapper with Lead Screw
FOR HIGH PRODUCTION PRECISION TAPPING

• Precision Ground Lead Screws Assure Finest Threads
• Electrically Controlled Cycle or Jog Tapping Action
• Hand, Foot or Fixture Switch Control
• Easily Adapted to Any Drill Press
• Range #0 to $\frac{3}{4}$ "

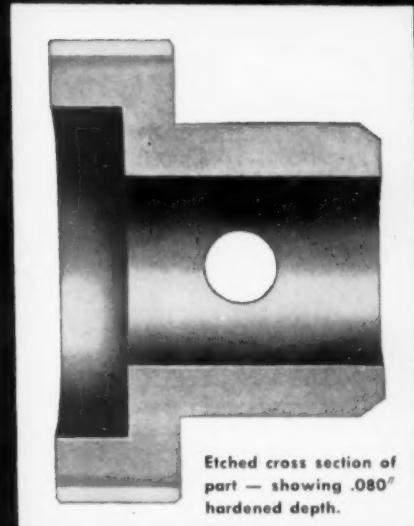
Built for high production tapping . . . precision or otherwise, the Commander Lead-Matic Tapper makes any drill press a precision tapping unit, even with inexperienced operators. Electric control of Cycle or Jog tapping action provides versatility to handle any job . . . automatic tap reversal eliminates drill press motor reversing and speeds tapping. Compact, ruggedly built, easy to operate, the Commander Lead-Matic Tapper will cut your tapping costs and reduce rejects to a minimum.

Write for illustrated circular and name of nearest Distributor.

Commander MFG. CO.
4232 W. KINZIE ST. • CHICAGO
PRODUCT OF COMMANDER
BUILDER OF PRODUCTION TOOLS

USE READER SERVICE CARD; INDICATE A-3-316-3

COSTS CUT 94%



with TOCCO* Induction Heating

A cost reduction of 94% resulted when heat-treatment of this Corn Harvester part was changed from carburizing to TOCCO-hardening. Look at the unit cost breakdown:

CARBURIZING

	TOCCO-Hardening
Degrease	\$0.0020 eliminated
Carburize	0.0200 eliminated
1st quench	0.0150 TOCCO, heat and quench \$0.0060
2nd quench	0.0150 eliminated
Draw	0.0050 eliminated (self-draw)
Shotblast	0.0035 eliminated
Internal Grind	0.0243 eliminated
External Grind	0.0166 eliminated
	<hr/>
	\$0.1014
	\$0.0060

"—Savings of 9½ cents per piece—\$4770.00 on each 50,000 piece batch, plus an hourly production increase from 120 to 300 pieces per hour, plus improved quality of the product by virtue of the deeper case and stronger core."

Have you investigated TOCCO's cost-savings possibilities for your hardening, brazing, melting or forging operations? Why not write us today or send blueprints of your parts —no obligation, of course.

THE OHIO CRANKSHAFT COMPANY



NEW FREE
BULLETIN

Mail Coupon Today

THE OHIO CRANKSHAFT CO.

Dept. G-3, Cleveland 1, Ohio

Please send copy of "TOCCO Induction Heating."

Name _____

Position _____

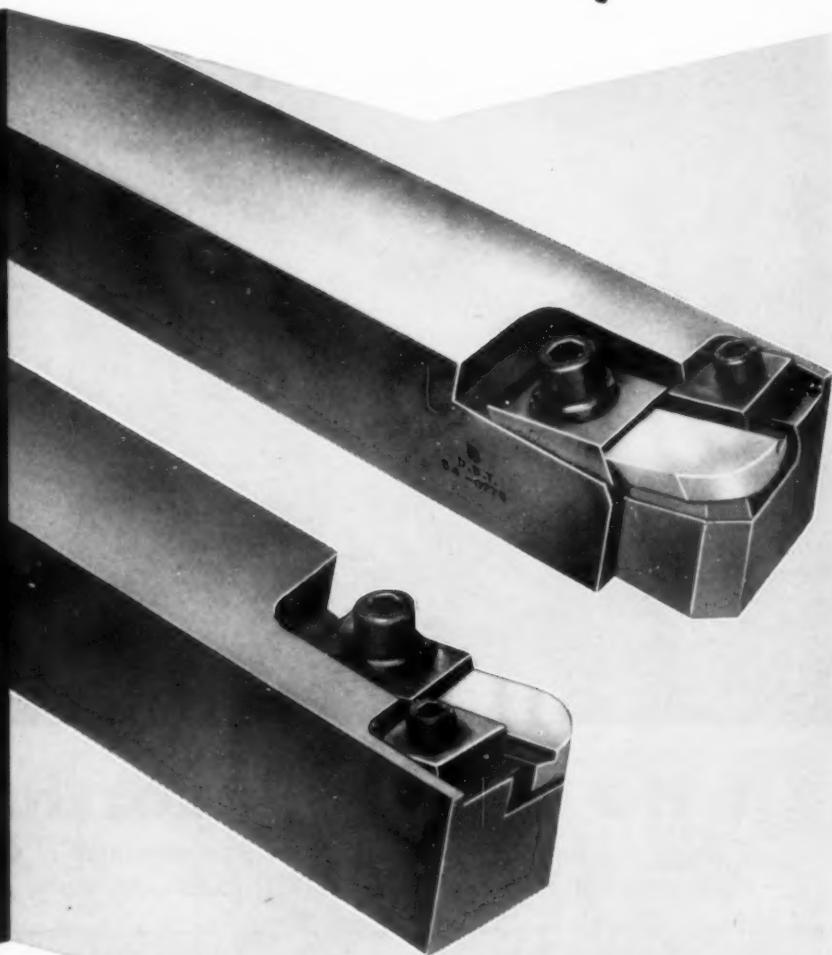
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Address _____

City _____ Zone _____ State _____

You're Invited to Inspect...

at
the
A.S.T.E.
Western
Industrial
Exposition



You won't want to miss inspecting these remarkable new Davis heavy-duty planer tools with clamped-on, adjustable carbide tips.

Providing full support for the carbide insert . . . plus specially engineered cutting angles . . . these advanced-design tools permit doubling previous maximum speeds and feeds on planers in good condition. A number of jobs are now running continuously at 400 fpm. on cast iron . . . with double the tool life between grinds.

In the patented Davis design, the carbide tips of these new planer tools are advanced by an adjustable wedge which also backs up the insert over its entire width.



the ONE COMPLETE Tool Line



Yes, one look at Davis and you're sure to agree that here is industry's most complete standard tool line. One quick check of its unparalleled range of types, sizes and cutter materials will convince you that only Davis offers the full advantages of one-source buying for all your boring, turning and planing requirements.

Here, too, at Davis you'll see designs from the one engineering group with the vision and background of metal working experience to produce special tooling of outstanding efficiency. So whatever your needs . . . at the show and in the shop . . . it's always good advice to see Davis first for the best in tooling.

DAVIS

BORING TOOL DIVISION OF

Giddings & Lewis Machine Tool Company
Fond du Lac, Wisconsin

THE ONE NAME THAT CERTIFIES ULTIMATE PRECISION AND PRODUCTIVITY IN TOOLING

Booth 454

SHRINE AUDITORIUM
AND EXPOSITION HALL

PLATED UNBRAKOS AT WORK



precision plating

1950

UNBRAKO FORMULA FOR PLATED SCREW QUALITY. Make the screw precisely undersize with the finest machines. Plate it under rigidly controlled conditions in the best available plating equipment. Guarantee the finished product—Class 3A thread tolerance after plating. It is this unique formula that permits us to supply, with extremely good delivery, the plated UNBRAKO socket head cap screws for such precision applications as this high-speed centrifugal separator used in the processing of fish oils. The story of plating at SPS is told in "Precision Plating—a product and a service." See your authorized industrial distributor or write on your business letterhead for a copy of it. STANDARD PRESSED STEEL Co., Jenkintown 37, Pa.



SOCKET SCREW DIVISION



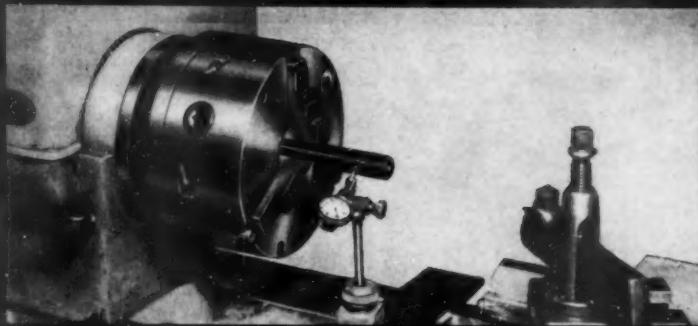
JENKINTOWN, PENNSYLVANIA

Now! The Oldest Name in Chucks adds Two Great NEW Lines

HORTON CHUCK

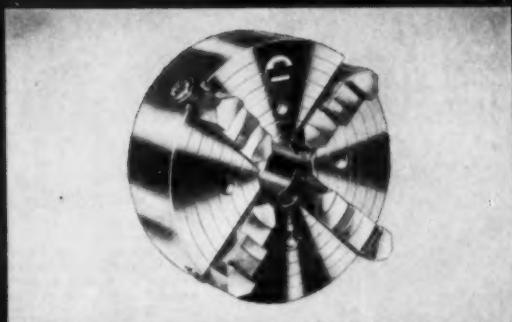
announces

The HORTON
Tru-Set
SELF-CENTERING CHUCK
Adjustable
To .0002" T.I.R.



- ★ Micro-screw adjustment guarantees repetitive accuracy to .0002" T.I.R.
 - ★ Meehanite bodies guaranteed for life.
 - ★ Three operating pinions for instant peripheral location.
 - ★ Available in diameters up to 12" in 3 and 6 jaw styles.
- * Both Horton Tru-Set and Windsor Chucks are packed in reusable airtight metal containers.

The HORTON
WINDSOR
Medium Duty
MEEHANITE CHUCK
Highest of Quality
at a Moderate Price



- ★ Meehanite bodies have tensile strength of 45,000 psi.
- ★ Scrolls of chrome nickel steel have tensile strength of 134,000 psi.
- ★ Self-contained operating screws for longer accurate life.
- ★ Available in stock up to 12" in universal and independent types. Larger sizes on request.

See your Horton Distributor for chucks
of quality . . . and economy.

See us at Booth No. 1023



WINDSOR LOCKS, CONN.

**NOW
YOU CAN**

- DRILL
- COUNTERSINK
- REAM
- COUNTERBORE
- TAP



**ERRINGTON
TAP-DRILL
ATTACHMENT**

Capacity to $\frac{1}{4}$ " drill and $\frac{5}{16}$ " tap. Available with 2, 3 or 4 spindles. Spindles spaced to handle work up to $5\frac{1}{2}$ " outside diameter.

ALL ON ONE DRILL PRESS SPINDLE

...without taking your hand off drill press feed handle. Yes...with this new Errington Tap-Drill attachment, you simply slide the work under the head from one spindle to another. An automatic reversing tapping spindle is built in, making it unnecessary to reverse the drill press for tapping.

Hardened and ground spindles. Gears turned on spindles (not pinned on). Heavy duty grooved ball thrust bearings all enclosed in a sand cast aluminum case and cover.

Send For Complete Information

ERRINGTON Mechanical Laboratory, Inc.

Established 1891

Main Office and Plant: STATEN ISLAND 4, NEW YORK

USE READER SERVICE CARD; INDICATE A-3-322-1

Get More Tool and Cutter Grinding Capacity at Lower Cost with...

the NEW STERLING Model "RK-2"

All types of cutting tools from single point lathe tools to 22° diameter saws can be ground quickly and accurately on this completely NEW Tool & Cutter Grinder.

Eliminating heavy, expensive anti-friction tables provides greater stability, better accuracy and increased capacity at LOWER COST.

The compact design puts all controls in easy reach of the operator—set-ups take less time...the floating spindle moves so easily that operator fatigue is cut to a minimum. Standard equipment includes centers with 11° swing, and 14° between centers.

You get more capacity for grinding tools and cutters at about $\frac{1}{2}$ the cost of a Universal Tool & Cutter Grinder with the NEW Sterling Model "RK-2".

Write TODAY for illustrated bulletin RK-2.

McDONOUGH MFG. CO.
1517 Galloway • Eau Claire, Wisc.

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**3 in 1
GUARD
of the
AIR
LINE**

M-B
**WHIRL-A-WAY
FILTER-REGULATOR
and
LUBRICATOR ASSEMBLY
MODEL W-3**

*the
BEST
PROTECTION
TO YOUR
AIR-VALVES,
CYLINDERS,
PNEUMATIC
TOOLS, ETC.*

The FILTER removes solids .00039 and larger. TRANSPARENT BOWL provides visibility. REGULATOR capable of passing large volume with unrestricted flow and minimum pressure drop. LUBRICATOR delivers desired volume of oil. Bowl can be refilled without shutting off air supply.

ANY OF THESE 3 DEVICES CAN BE USED AS SEPARATE UNITS OR IN ANY COMBINATION

M-B PRODUCTS
46 VICTOR AVE., Div. 17
DETROIT 3, MICHIGAN

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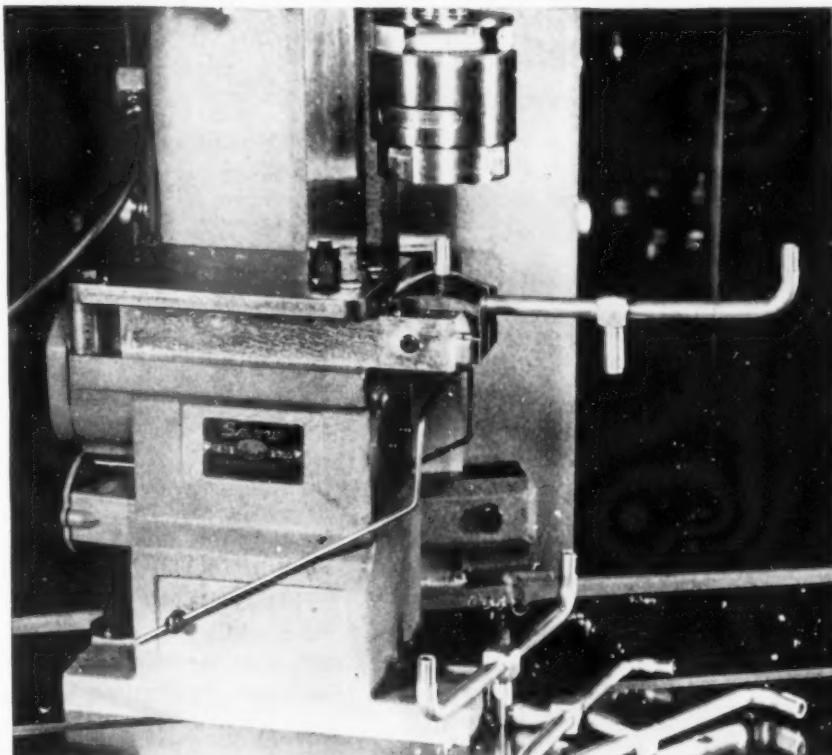
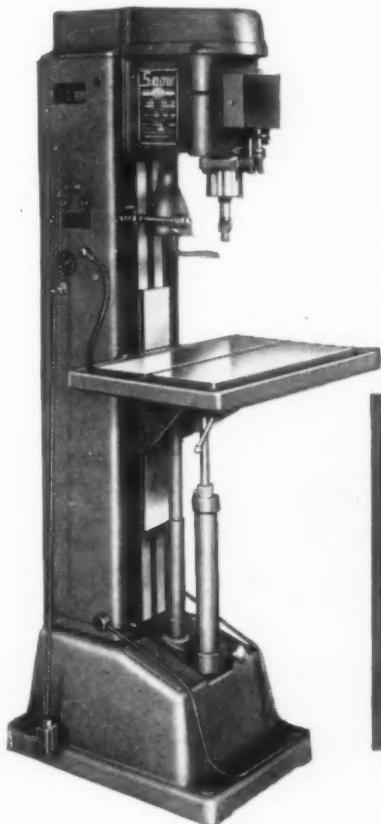
Quicker changeover, lower tooling costs...

with **SNOW** FULL
UNIVERSAL
MACHINES

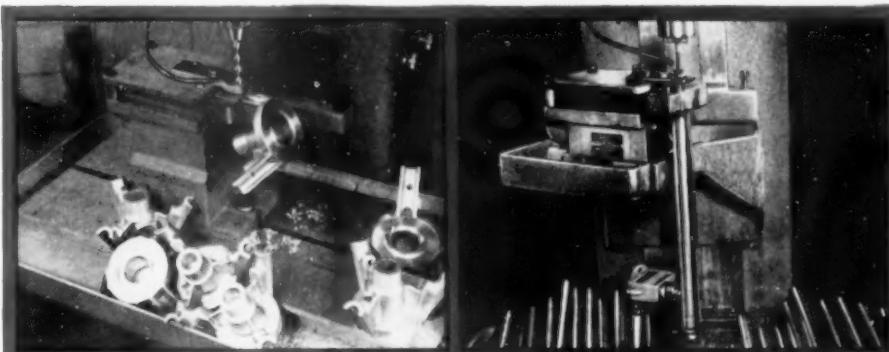
ELECTRICALLY OPERATED AIR CONTROLLED AUTOMATIC OR SEMI-AUTOMATIC

Basic Master Fixtures for DRILLING, THREADING or TAPPING. Snow universal machines are the most flexible, most efficient, and most economical known. They save countless dollars in change-over time — help you start jobs sooner — assure quality at high production rates.

The square footage under a Snow Machine in your factory can be the most profitable in your whole plant. Submit details of your requirements.



AIR VISE holds part firmly — self-centering — always in exact position for precision work. U-shaped wire underneath provides quick finger-tip control, automatically starting spindle cycle. Jaw inserts keep tooling costs at minimum. Blank jaws always in stock — can be tooled to fit your part promptly, inexpensively.



Irregularly shaped parts are easily handled. Front feed permits close setting of guide plate for greater accuracy with high production.

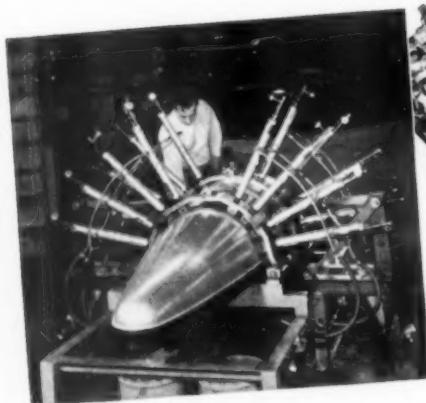
Here a short AIR VISE mounted on an offset table holds long tubing. Piece-part switch under table automatically closes vise and starts tapping operation.

SNOW MANUFACTURING CO., BELLWOOD, ILL.

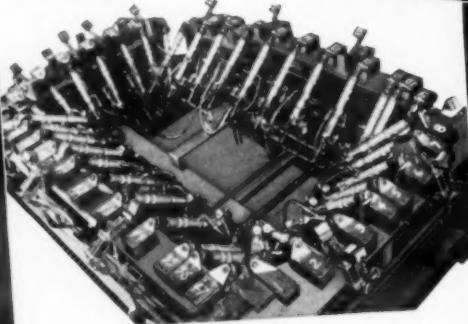
(Suburb of Chicago)

MULTIPLE DRILLING WITH KELLER "Airfeedrills"

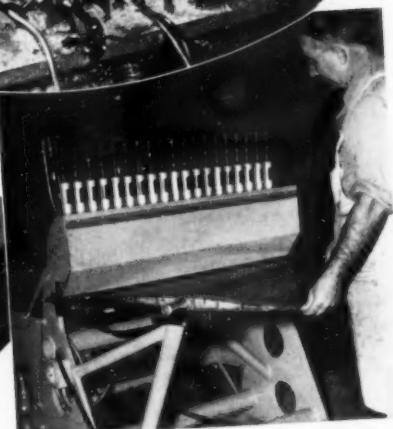
Low investment and easy change-over make Airfeedrill setups the ideal way to make accurate holes at low cost



Sixteen holes made simultaneously on teardrop gas tank. Note the drilling angles



47 Airfeedrills on a single fixture for making trim holes in automobile roof panels



Fixture with 19 Airfeedrills used on guided missile fins at an aircraft plant

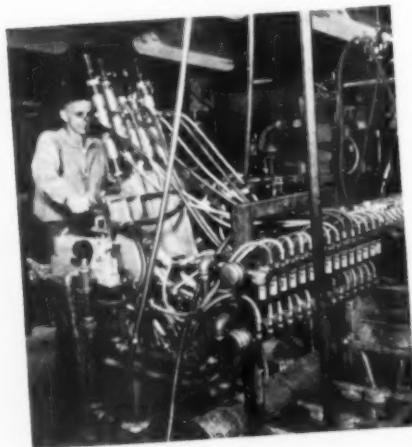


Eight Airfeedrills (four with dual spindles) drill 12 holes in 24ST aluminum part

Here is the new way to handle multiple drilling jobs without investing in expensive machine tools. Simply build a fixture on which to mount Keller Airfeedrills . . . connect them with your air supply . . . and you are in business.

When the job has been run, the Airfeedrills are detached for use on another job. Where jobs are intermittent or short run, Airfeedrills permit high production where no other multiple drilling method would be economically feasible.

If you are not acquainted with the remarkable possibilities of Keller Airfeedrills, send for information without delay. Ask for Catalog Sections 92 and 92A.



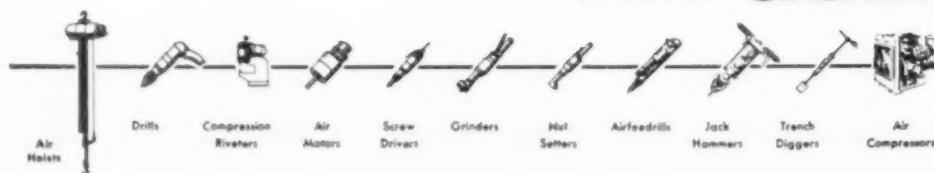
Fixture with 16 Airfeedrills used on section of automobile instrument panel

KELLER

"Airfeedrills"

KELLER TOOL

DIVISION OF **GARDNER-DENVER**



1311 Fulton Street
Grand Haven, Michigan

one
answer...
HANNA
for all
three...

The Hanna name is your assurance of quality. It is backed by over 50 years of specialization on cylinders and control valves. It means economical cylinder power, dependable engineering help and prompt delivery. See your Classified Directory or your Hanna Catalog for the name of your local representative. He is ready to help you solve your power motion problems. Call him today!

Send for your free copies of these valuable Hanna Catalogs:

- No. 236 Hanna Low Pressure Cylinders
- No. 233A Hanna High Pressure Cylinders
- No. 750 Hanna Medium Pressure Cylinders
- No. 254 Hanna Control Valves

March 1955

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-3-325



labor-saving cylinder power

**Standard Hanna Cylinders—
Matched to the Job!**

A choice of hydraulic and pneumatic cylinders to match your power and mounting requirements . . . to improve control and operation of machines and equipment . . . to replace or reduce manual operations. Hanna Valves provide hand, foot, cam or pushbutton actuation; manual, semi-automatic, full automatic or remote control operation.



money-saving engineering

**Nation-wide, on-the-spot
Sales and Engineering Service!**

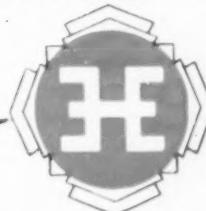
Hanna experts in cylinder power applications are always ready to help you select the best cylinder and valve combination for your special requirements, to see that you get the most value from your cylinder dollar.



time-saving delivery service

**Planned Production Scheduling
Assures Prompt Delivery!**

Hanna Sales Representatives located in principal cities throughout the U.S. and Canada can give you **less than three weeks' delivery** on Hanna Cylinders. They carry a stock of Hanna Valves for immediate delivery.



Hanna Engineering Works

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HYDRAULIC AND PNEUMATIC EQUIPMENT... CYLINDERS... VALVES... RIVETERS

*its slashing tool costs on
mass production
reaming jobs....*



This Staples Carbide-Tipped Shell Type Expansion Reamer has won unchallenged leadership for low cost, high precision reaming in mass production. In automotive, aircraft engine, household appliance, farm machinery and many other metalworking industries, this Staples tool is daily proving its ability to produce close tolerance, fine finish work at exceptional tool cost savings.

When the tool wears undersize, it can be accurately expanded to original diameter by driving the shell up the tapered arbor. After repeated sharpening and expansion, the tool is returned to new condition simply by replacing the worn shell—a standard stock item.

Enthusiastic comments from many manufacturers attest to the real savings this Staples Reamer produces. Try it on your production lines. Your inquiry will bring a prompt response.

Staples CARBIDE-TIPPED CUTTING TOOLS

A complete line of Circular Carbide-Tipped Tools, Expansion Reamers—Special Tools

THE STAPLES TOOL COMPANY
CINCINNATI 25, OHIO

REHNBERG-JACOBSON

RIM-BALL INDEX TABLES

WILL TAKE
GREAT WEIGHT
•
EXTREMELY RIGID
•
COMPLETELY
SELF-CONTAINED
•
RIM-BALL BEARING
•
EIGHT SIZES
54", 48", 42", 36",
30", 24", 20", 16"
•
3 TO 12 INDEX
POSITIONS
(54"-48" minimum 5 Positions)



16"

54"



USE THEM IN MANY WAYS ... INSTALL THEM YOURSELF

It is hard to suggest *all* the possible ways you might use these index units. In addition to many conventional methods of horizontal mounting, they may also be set vertically to act as face plate or trunnion arrangements. Work-holding fixtures of almost any kind can be attached as desired. The RIM-BALL bearing enables the table to support great weight, yet turn easily, and it also eliminates any tendency for the table to tip or twist. A fixed center post, as shown above, can be furnished if wanted. Rehnberg-Jacobson Index Tables are shipped completely assembled and tested, ready for you to install by simply bolting down the base flange and mounting the drive motor. Complete data sheets showing dimensions of all models are available, and will be sent promptly on request.

Designers and Builders of Special Machinery

REHNBERG-JACOBSON MANUFACTURING COMPANY



2135 KISHWAUKEE ST.

ROCKFORD, ILLINOIS

SOMETHING NEW for the MACHINIST



MOUNTING WORKPIECES ON ROTARY TABLES WITH TEE-SLOTS UP TO 1" IS A SIMPLE JOB WITH NEW J & S DOWNHOLDING TEE-SLOT CLAMPS.

ELIMINATE STRAPS and SAVE 75%

New J & S Tee-Slot Clamps eliminate straps—keep entire work surface free—cut handling time up to 75%

Up to now, loading and unloading workpieces on a rotary table has been an awkward, time-consuming job. New J & S downholding Tee-Slot Clamps make the job easier, save as much as 75% of the time usually required with old methods.

Other Advantages

J & S Tee-Slot Clamps avoid the use of U-clamps and straps. They keep the entire surface of the workpiece free, prevent interference to the drilling operation. They allow a bigger job to be handled on a smaller table.

"Double-Action" Principle

The Tee-Slot Clamp is typical of the

entire line of J & S downholding tools. Attaching parallel blocks are integral parts of the clamp, make it a complete unit. Because of its "Double-Action" principle (an exclusive feature of all J & S Jaw Clamps), centering is quick, simple.

There's no distortion in centering. Turn the adjusting screw and the jaw travels straight *in* and *down*. This forces the workpiece horizontally against the opposite clamp and downward against the rotary table.

Write for complete information. Fill in the coupon and mail it today.

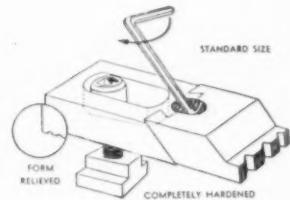
Representatives in Principal Cities

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

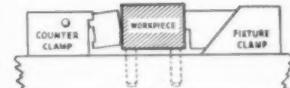
543 W. MT. PLEASANT AVENUE, LIVINGSTON, N. J.

OTHER J & S WORKHOLDING TOOLS for MACHINE TABLES

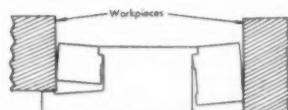
Feature "Double-Action" Principle, exclusive with J & S Tools



J & S "All-Purpose" Jaw Clamps. For use on lathes, planers, milling machines, boring millers, drill presses, etc. Eliminates U-clamps and straps. Sets up easy, fast.



J & S Counter and Fixture Clamps. For rapid loading and unloading. Drawing shows how you can machine one piece at a time, using pins to locate workpiece.



J & S Double 1/2 Vise. For use with J & S "All-Purpose" Jaw Clamps. Hinged, spring-loaded jaw gives positive downholding action.

J & S Tool Co., Inc.,
W. Mt. Pleasant Avenue,
Livingston, N.J.

Please send me complete information on
J & S workholding tools.

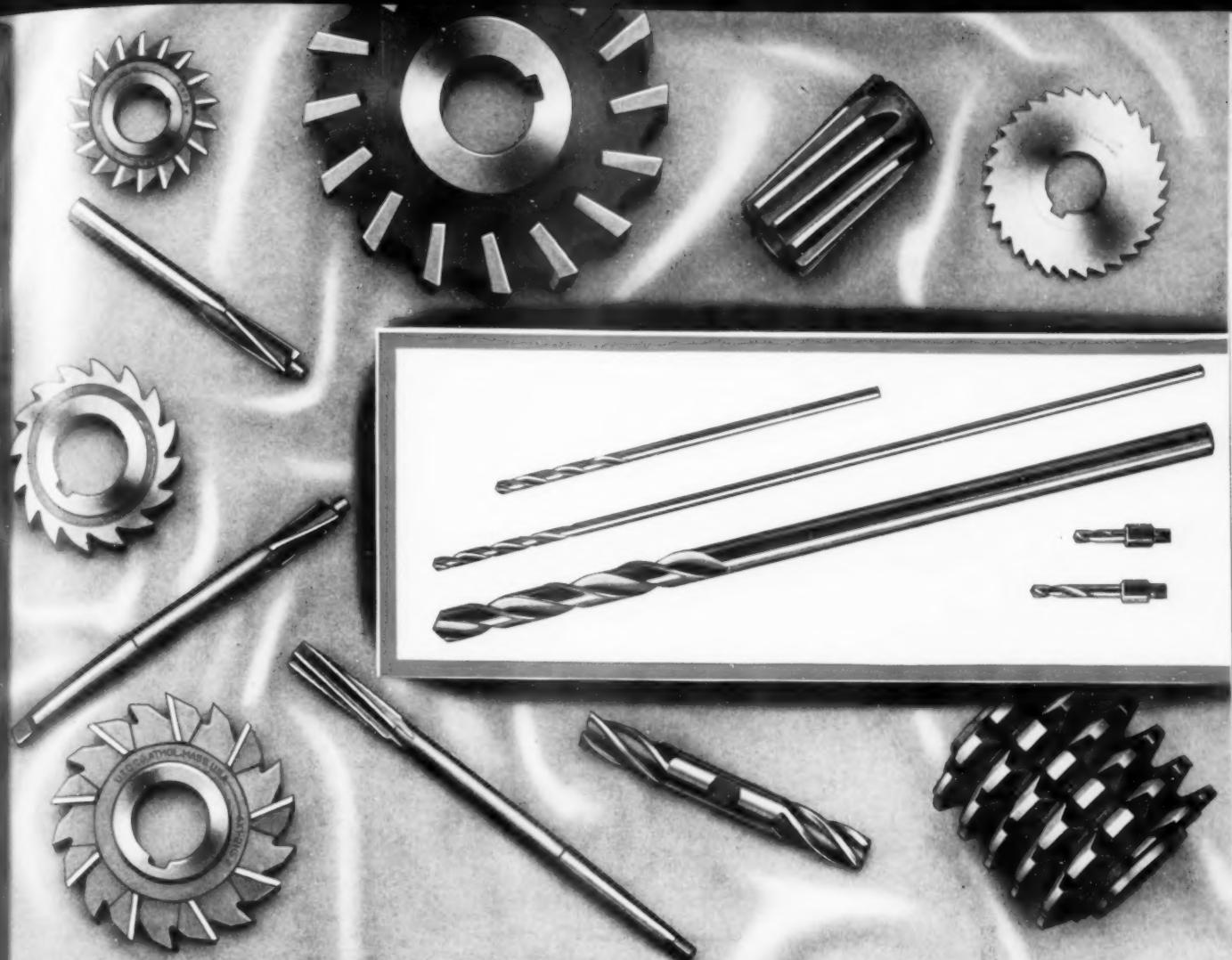
NAME.....

COMPANY.....

STREET.....

CITY..... STATE.....





IN THE
AIRCRAFT INDUSTRY, IT'S

UNION

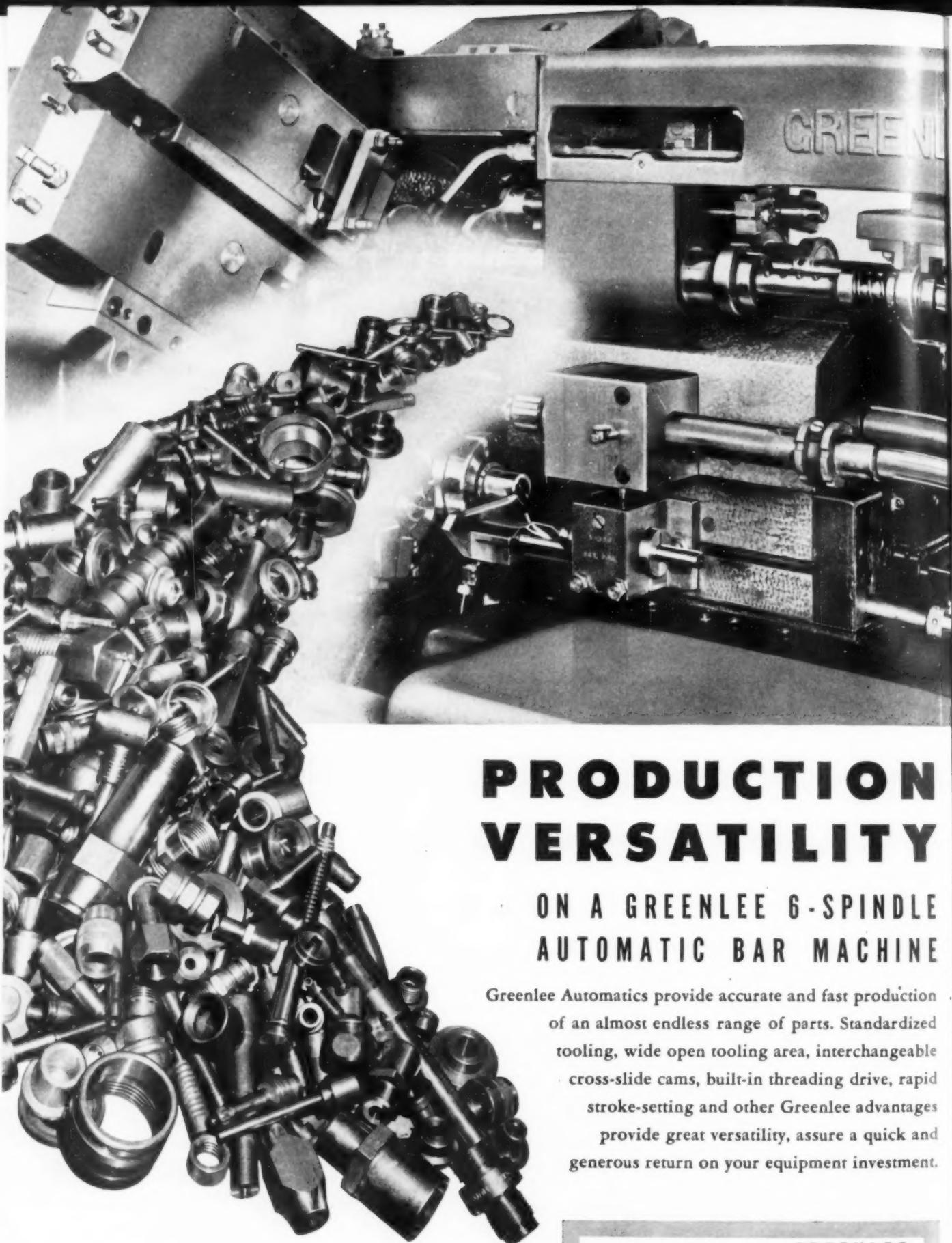


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OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec



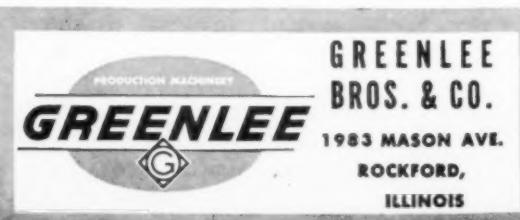
PRODUCTION VERSATILITY

ON A GREENLEE 6-SPINDLE
AUTOMATIC BAR MACHINE

Greenlee Automatics provide accurate and fast production of an almost endless range of parts. Standardized tooling, wide open tooling area, interchangeable cross-slide cams, built-in threading drive, rapid stroke-setting and other Greenlee advantages

provide great versatility, assure a quick and generous return on your equipment investment.

PHONE ROCKFORD, ILLINOIS 3-4881
TO HELP SOLVE YOUR PRODUCTION PROBLEMS



PRECISION-PREPARED TOOL STEEL FLATS AND SQUARES

for tools...dies...precision parts

Wärplis OIL HARDENING

GROUND FLAT STOCK

Carbon	.90%	Manganese	1.10%
Chromium	.50%	Tungsten	.50%
Vanadium	.15%		

Generally regarded as the finest of its type . . . the most versatile and adaptable for the widest range of purposes.

"Pittsburgh" AIR HARDENING

GROUND FLAT STOCK

Carbon	1.00%	Manganese	.50%
Chromium	5.25%	Molybdenum	1.10%
Vanadium	.25%		

5% chrome type . . . offers superior toughness and wearability for long-run or out-of-the-ordinary applications.

These analyses, familiar to users of fine steel everywhere, have long been favoured for ease of working . . . for excellent hardness and toughness without appreciable warpage or dimensional change . . . for dependable performance.

What promotes the steel to still higher esteem is precision preparation by **improved** grinding techniques, ensuring smooth, flawless, decarb-free surface . . . close accuracy . . . truly square corners . . . flat and parallel sides.

With fine steel thus prepared none of the time and talent of the skilled worker need be spent on get-ready—no metal wasted. Procedures may be simplified . . . quality controlled . . . work speeded . . . time and money saved.

Wärplis oil hardening comes in the complete range of 651 standard sizes; "Pittsburgh" air hardening in 168 standard sizes within the more limited range for which this grade is best adapted.

Each precision-prepared piece is indelibly name-branded . . . each comes in its own protective wrapper bearing size, brand, analysis, and easy-to-follow hardening instructions.

The size and grade of your choice is conveniently obtainable from selected distributors coast-to-coast. Order by name . . . or ask us for complete information.

PITTSBURGH TOOL STEEL WIRE CO.

MONACA, PENNA.

Also precision-prepared oil hardening, water hardening and high speed drill rod rounds . . . water hardening flats and squares . . . cold finished fine steels in all sizes, grades and shapes.

**"10 little cyanide pots
..and then there were
none"**

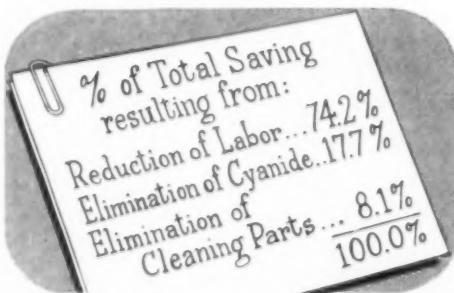
1. Featuring Singer Sewing Machines and Lindberg Carbo-nitriding Furnaces.



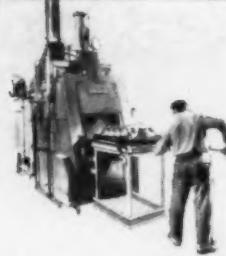
3. It replaced 10 liquid cyanide furnaces.



5. In 12 months, the new Lindberg Carbo-nitriding furnace paid for itself in savings.



7. . . submitted this report to his top management.



2. Singer Manufacturing Co. bought a new Lindberg Carbo-nitriding furnace.



4. The new furnace heat treats parts for "industrial sewing machines" . . . used for stitching canvas, mattresses, overalls, etc.



6. Mr. Lloyd R. Raymond, Supt. of heat treating at Bridgeport plant of Singer.



8. . . with this requisition for a second Lindberg Carbo-nitriding furnace (to double production of carbonitrided parts).

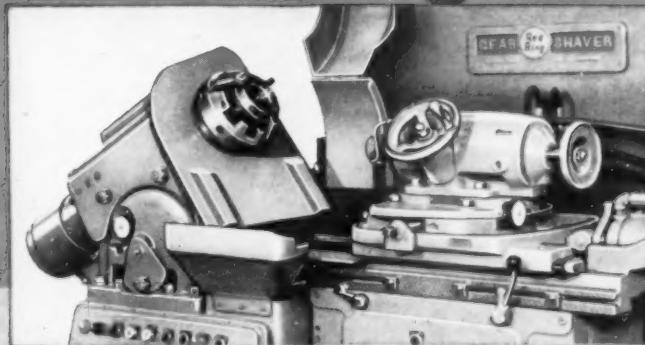
End of Story

LINDBERG FURNACES
LINDBERG ENGINEERING COMPANY
2449 W. Hubbard Street • Chicago 12, Illinois

Visit Lindberg at ASTE Show, Booth No. 666 and
ASM Western Metal Exposition, Booth 334

New Machine Shaves INTERNAL GEARS Faster and to Closer TOLERANCES

This new Red Ring Model "GCR" is a high production, high precision shaving machine for a broad range of internal gears. It provides two methods of shaving and many advantages which heretofore were available only on external gear shaving machines.



- It will precision shave all spur or helical internals 3" to 12" PD, up to 4 diametral pitch with face widths to 2½".
- It will operate on an automatic and selective feed cycle.
- It provides the opportunity to use a new, rapid PLUNGE-CUT shaving cycle in addition to conventional shaving.
- Crownning by the Plunge-cut method is optional.
- It will taper-shave gear teeth.

- It assures precision comparable to that established by Red Ring Machines for external gears.
- It reduces loading and unloading time to a minimum.
- It handles gears having integral shafts.

When using the automatic feed cycle a selected number of cutting strokes, each with its own selected increment of up-feed, can be combined with whatever idling strokes are desired. At the end of the cycle the machine automatically stops in the proper backlash position for rapid unloading.

If your manufacturing program includes internal gears, write for complete information on this new shaving machine.

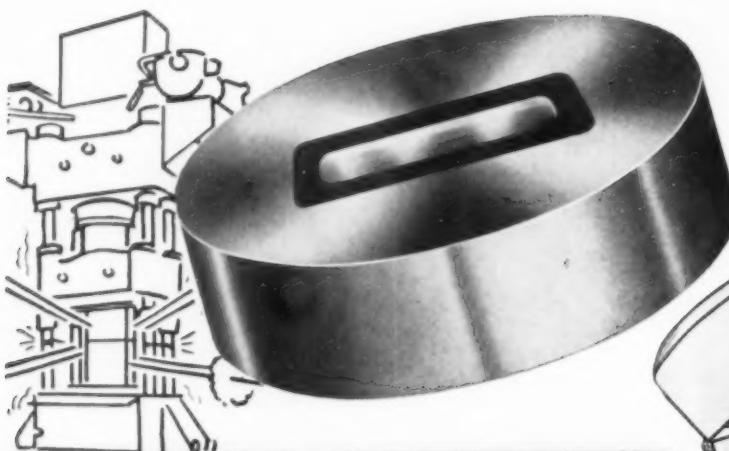
SPUR AND HELICAL
GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORM



NATIONAL BROACH & MACHINE CO.
5600 ST. JEAN DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

7112



12,979,660 LIGHTER CASES WITH **TALIDE DIES**



SWAGING DIES

Leading Fountain Pen Manufacturer cold swages 33 times more stainless steel parts with TALIDE dies.



HEADING AND EXTRUSION DIES

Cold-heading $\frac{3}{4}$ " carriage bolts, TALIDE dies produced 1,500,000 pieces, steel dies only 50,000.



SHEET METAL DIES

137,000 hi-alloy steel Pressure Vessels drawn with TALIDE, against only 7,900 with steel dies previously used.



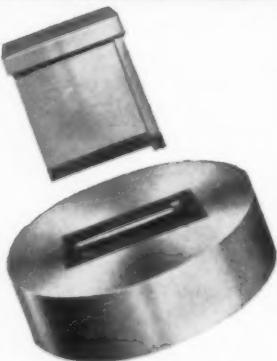
CURLING ROLLERS

TALIDE Curling Rolls last 65 times longer than steel rolls on beverage can forming operation.



POWDERED METALLURGY DIES

Pill dies of TALIDE metal outlast steel dies 100 to 1 while reducing rejects 82%.



BLANKING AND FORMING DIES

70 times more paper discs blanked out with TALIDE—over hard alloy die.

A leading producer of cigarette lighter cases was experiencing considerable trouble using steel dies. An excessive number of lighter cases were being scrapped due to tears and deformation. Die cost was running \$0.028 per lighter. Operation involves drawing .020" thick carbon steel on A-3 Niagara presses, 45 strokes per minute.

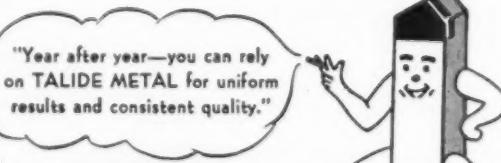
Our die engineers were called in, and after installing specially designed Talide dies on customer's press line, rejects were eliminated, as well as time previously spent in buffing and polishing the cases after drawing. Subsequent plating expense was reduced $\frac{1}{3}$ due to the smoother surface on the cases drawn.

The original 15 Talide dies placed in production have now drawn a total of 12,979,660 cases for an average life of 865,310 per die. Previous steel dies produced an average of 15,000 cases per die. Die life was therefore increased 58-1 after the installation of Talide dies.

Die cost has now been reduced to \$0.0008 per lighter drawn, and customer estimates his saving for the past year, using Talide dies, has been at least \$25,000.

IMPROVED QUALITY

Additional refinements and improvements in our process have added still longer life to the wearing edges of Talide tools, dies and wear-resistant parts. The result is a carbide having a new, unique grain structure with harder and tougher properties than previous grades. Laboratory tests reveal our improved grades possess 25% greater strength and rigidity. Service life per grind up to 50% longer than previous grades has been proven in grueling field tests.



HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS
HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

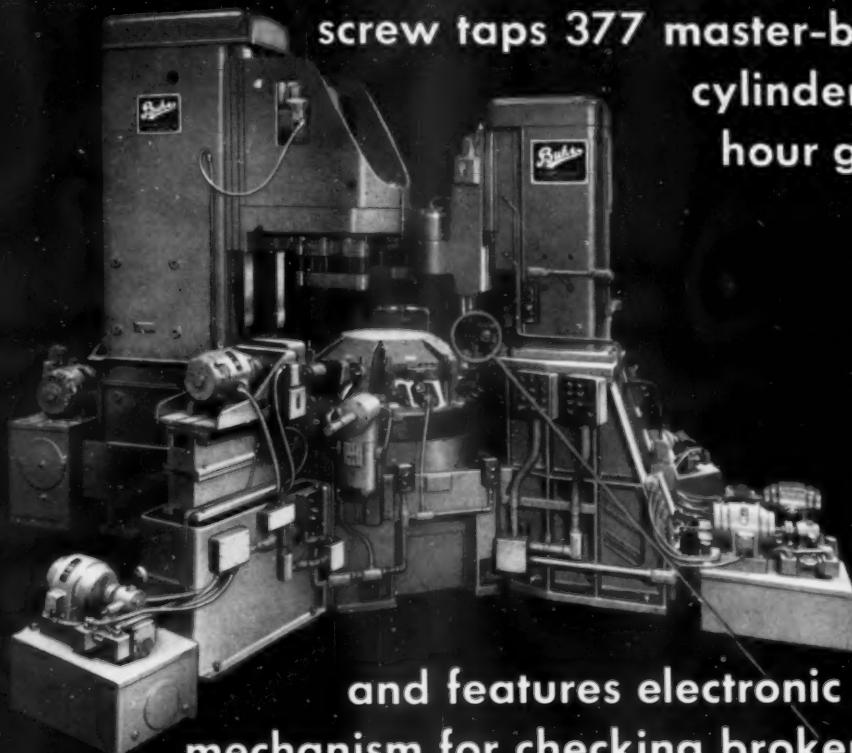
Send for new 84-page Catalog 55-G or ask for sales engineer to call.

ANOTHER EXAMPLE OF
REDUCING COSTS WITH-

Buhr

ECONOMATION

Drills, chamfers, spot-faces and individual-lead-screw taps 377 master-brake cylinders an hour gross...



and features electronic mechanism for checking broken drills!

This 7-way dial-type hydraulic-feed Buhr Special has a 48"-diameter 7-position power-operated index table, complete with shot bolt. Two parts are loaded per station in each of its seven fixtures. Automatic clamping of fixtures is performed by a power-wrench with torque control.

Electronic mechanism automatically checks two .028 drills. Following each cycle, drill-checking arms swing sensing probes to and from drills. If either drill is broken, special electronic sensing-circuit stops machine and flashes failure-light.

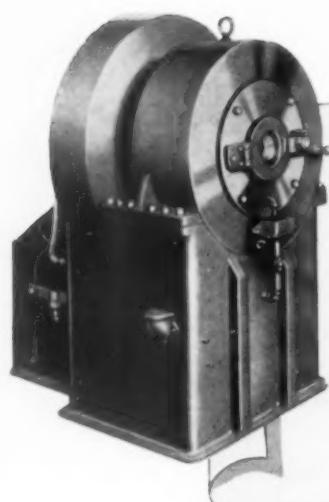


Find out how Buhr Economation can reduce your production costs. Phone, wire or write us. A consultation with one of our top sales executives will be arranged promptly!

Buhr
MULTIPLE-SPINDLE
HIGH PRODUCTION MACHINERY

BUHR MACHINE TOOL CO. ©
ANN ARBOR, MICHIGAN

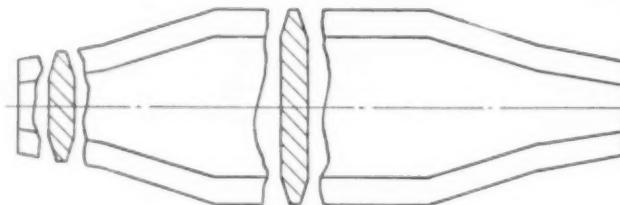
Solidly Engineered • Precision Built • for World's Leading Manufacturers



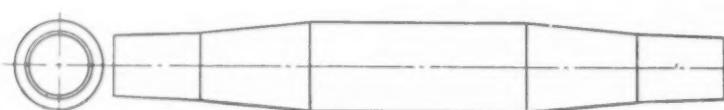
Swaging Success Stories



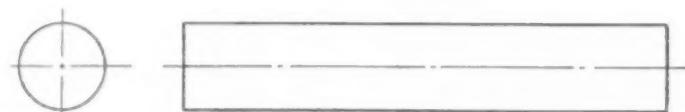
*Swaging prior to forging . . .
saves materials, machining, trimming*



This precision-forged piece under normal procedures would have required extensive trimming and machining operations. But Torrington's swaging experts suggested a method that saved time and material—cut finishing operations to a minimum.



A round blank was swaged to a predetermined double taper shape prior to forging. This produced a forging blank of the required uniformity that facilitated the flow of metal to the desired shape in the forging operation.



And, since the new blank was smaller than the one used before swaging, expensive material was saved.

**Swaging Advantages . . .
No Chips . . . No Waste
. . . No Scrap**

Swaging reduces metal—saves material—does not cut it away wastefully.

Swaging work hardens metal—gives it added strength, better finish and resiliency, dimensional accuracy.

Swaging is fast—can be done by unskilled workers to produce more pieces at lower cost.

Write for our informative booklet on swaging that gives detailed descriptions of Torrington Rotary Swagers. It may show you how to achieve new savings in your own plant.



THE TORRINGTON COMPANY
Swager Department
444 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON **ROTARY SWAGING** **MACHINES**



Finishing With The "Touch of Gold". In the finer grit sizes ALUNDUM B abrasive is unequalled for the polishing that means better looking products.

Across the range of polishing jobs . . .

Norton ALUNDUM* B Abrasive adds the "TOUCH of GOLD" that steps up production and profits



Roughing With The "Touch of Gold"
ALUNDUM B abrasive in the coarser grit sizes, removes stock faster, saves time and money.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

In Norton ALUNDUM B abrasive you get a truly all-purpose polishing grain, expertly engineered to cut costs and improve product quality "across the board" in your polishing operations. Here are some typical advantages that mean top performance in every set-up:

- **Uniform grain shape**, the result of careful processing that eliminates flats and slivers, leaving only solid, blocky grains that stand up better and polish faster.
- **Uniform grain sizings**, with no oversize grains that mar the finish, no undersize grains that skip their share of work.
- **High capillarity**, assuring the easy absorption of adhesive that means

longer lasting, better performing set-up wheels.

- **Usable with cement or glue**, it is equally firm-clinging and efficient with either.
- **Made in all grit sizes** from 20 through 240, to cover the widest range of polishing jobs, from roughing to fine finishing.

See your Norton Distributor for prompt deliveries of Norton ALUNDUM polishing abrasive. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone directory, yellow pages. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

Making better products...to make your products better

NORTON

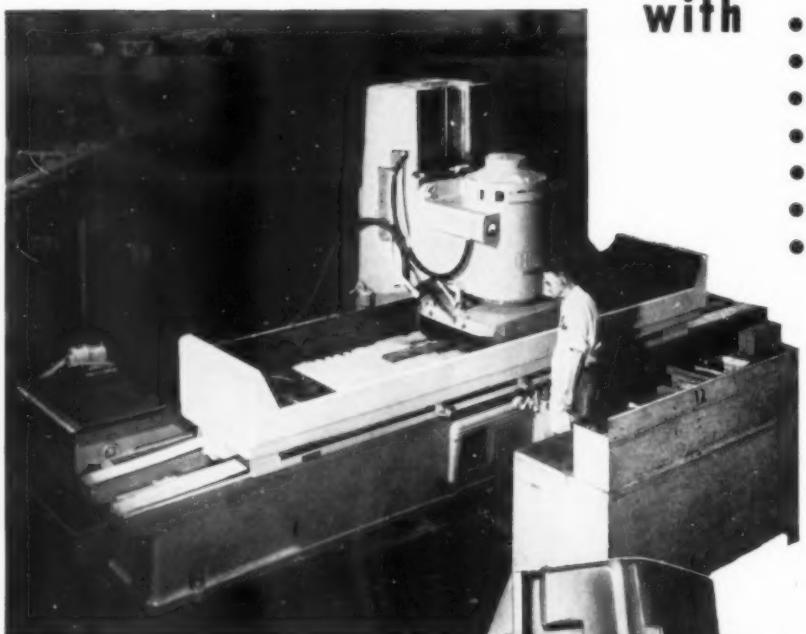
and its BEHR-MANNING division

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

HILL

... THE SURFACE GRINDER
WITH *All* THE WORTH-WHILE FEATURES

Two types, Horizontal Spindle or Vertical Spindle



with

- Open Side Accessibility
- 100% Hydraulic Table Drive
- Built-in Spindle Motor
- Centralized Assembly Controls
- Low Pressure Hydraulic System
- One Shot Lubrication
- Adequate Safety Devices

- The "HILL" Vertical Spindle Grinder for rapid stock removal and accurate grinding of flat surfaces—recommended for accuracy, speed and finish—features that mean increased precision production. Made in table widths of 18", 24" and 30" with table lengths from 5 to 20 feet.

- The "HILL" Horizontal Spindle Grinder for a wide range of grinding—flats, angles, irregular and special shaped surfaces—ideal for maintaining close tolerances with superior finish. Made in table widths of 18", 24", 30" and 36" with table lengths from 5 to 20 feet.



THE HILL ACME COMPANY

1209 WEST 65th STREET • • • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING
TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • PORTABLE FLOOR CRANES • "CLEVELAND" KNIVES • SHEAR BLADES

OK MILLING CUTTERS IN THE AIRCRAFT INDUSTRY—NO. 8

OK milling cutters hogmill centerslot of counterweight forging for world's most powerful piston aircraft engine

Great advancements have been made in the art of milling metal in recent years, especially in the aircraft industry. And, no where is this better exemplified than at the new Pratt & Whitney Aircraft plant at North Haven. Here, everything is ideal. Ample room for every operation. Hundreds of milling machines, all kinds, sizes. Thousands of metals cutting tools. Here, you get a realistic definition of the meaning of close tolerances.

In the illustration, an OK face mill is rough-milling a slot $3/16 \times 8"$ in a tough steel forging for a counterweight used in the Wasp Major engine.

OK milling cutters are favorites of the aircraft industry—engine builders, frame manufacturers, component part makers. OK cutters have more beef in the body, are heavier size for size. Blades once driven home, sit secure, unmovable.

Mated serrations prevent side-sway and form an accurate measurement for blade advancement to compensate for wear. Mills with this fine adjustment feature reduce grinding to less than .005" per blade.



OK MILLING CUTTER ON A MILWAUKEE VERTICAL SEMI FINISH—MILLS SLOT OF A TOUGH AIRCRAFT STEEL FORGING AT NEW PRATT & WHITNEY AIRCRAFT PLANT, NORTH HAVEN, CONNECTICUT.

Write for OK Tool Catalogs

"MODERN MILLING CUTTERS FOR MODERN MILLING MACHINES"
"AMERICA'S FIRST SYSTEM OF SINGLE POINT TOOLS"

TWO COMPONENTS—BODY AND BLADES

SIMPLE . . .

STRONG . . .

SUFFICIENT . . .



OKS

modern milling cutters for
modern milling machines

THE OK TOOL COMPANY INC.

Milford, New Hampshire

REFRIGERATOR MANUFACTURERS

USE MICROHONING

*to cut
processing
costs*

In this cost-conscious era of close competition, there is a constant search for methods to reduce manufacturing costs. One way this is being accomplished by manufacturers of refrigeration equipment . . . is by making full use of the Microhoning process on vital functional surfaces of parts such as the bearing plate, crank case, main frame, front head casting, connecting rod, cast-iron housing, cylinders, pistons, and various small bushings.

What is Microhoning and how does it reduce manufacturing costs?

Microhoning is an abrading process that combines stock removal, geometric accuracy, size control and surface finish into one automatic operation. The rotating and reciprocating, automatically-expanding tool self-dresses its abrasives through its own motions, while faithfully duplicating the required surface finish.

The savings are in time, effort and equipment required to obtain comparable results by any combination of other means. Why not have a Micromatic Field Engineer discuss with you the advantages of Microhoning in your processing plans?



Write today for
Cross-Hatch
Vol. 6—No. 4



MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVE., DETROIT 38, MICHIGAN

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MICRO-MOLD MFG. DIV. 2205 Lee Street 1535 Grande Vista Avenue 330 Grand River Avenue
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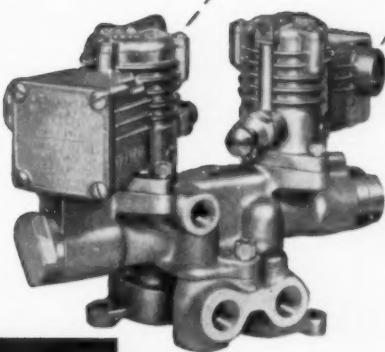
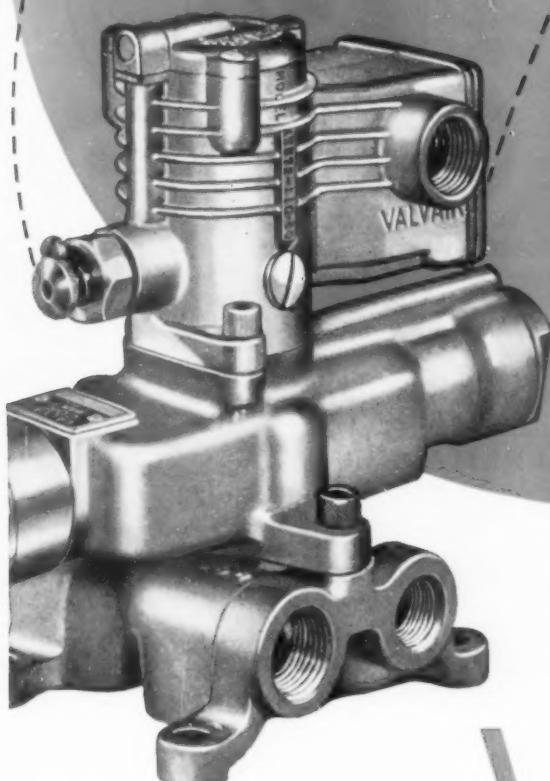
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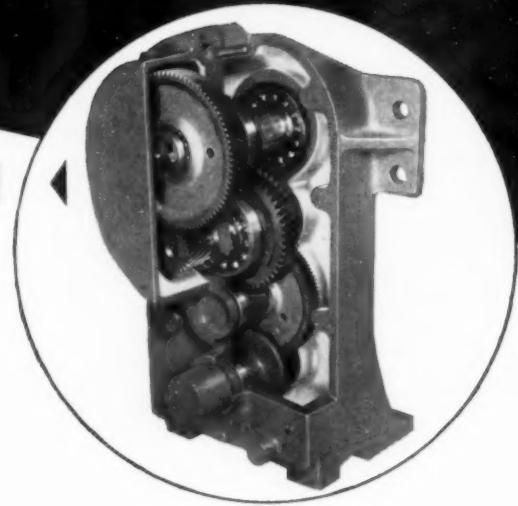
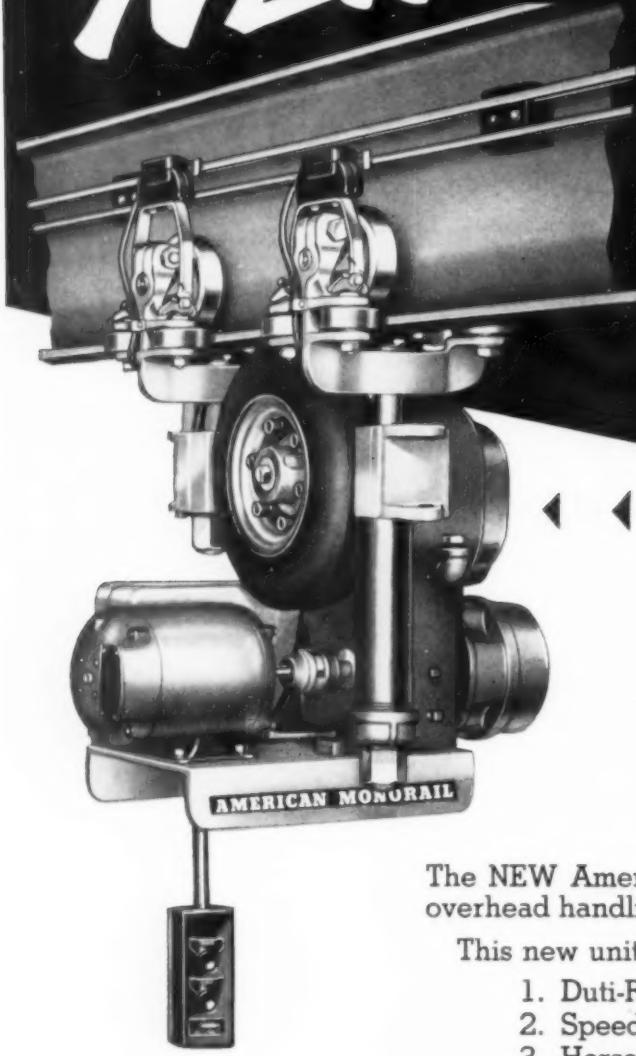
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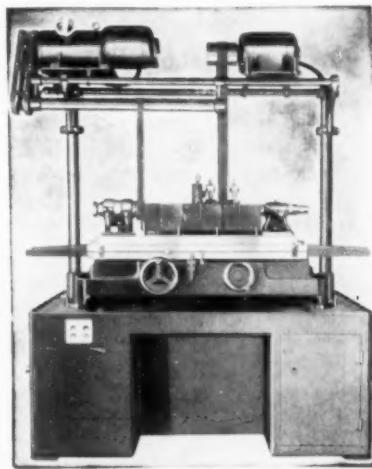
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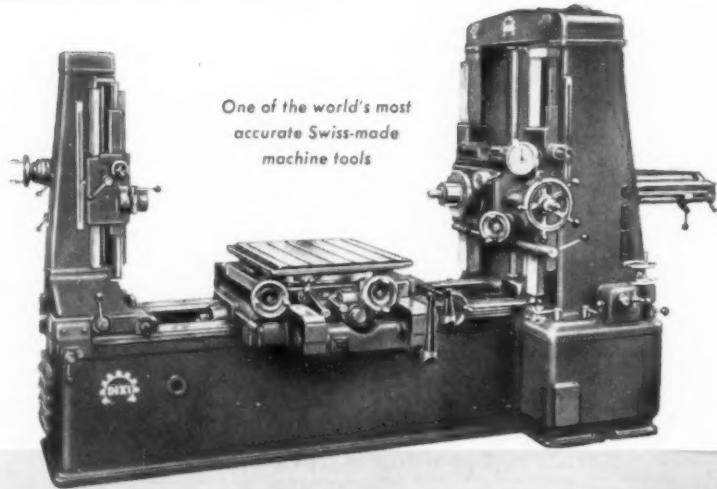
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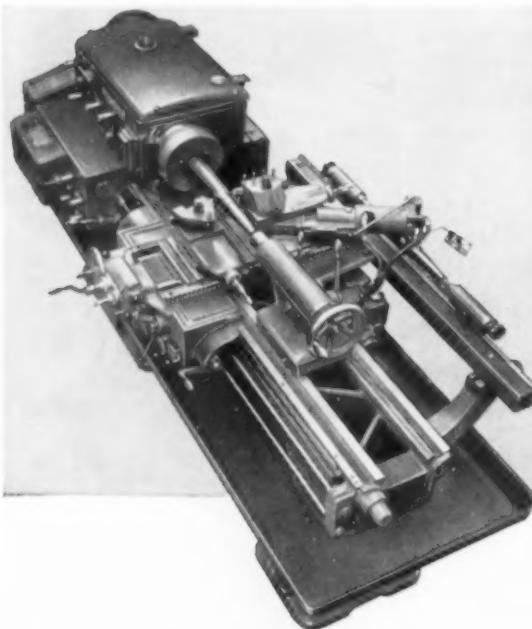
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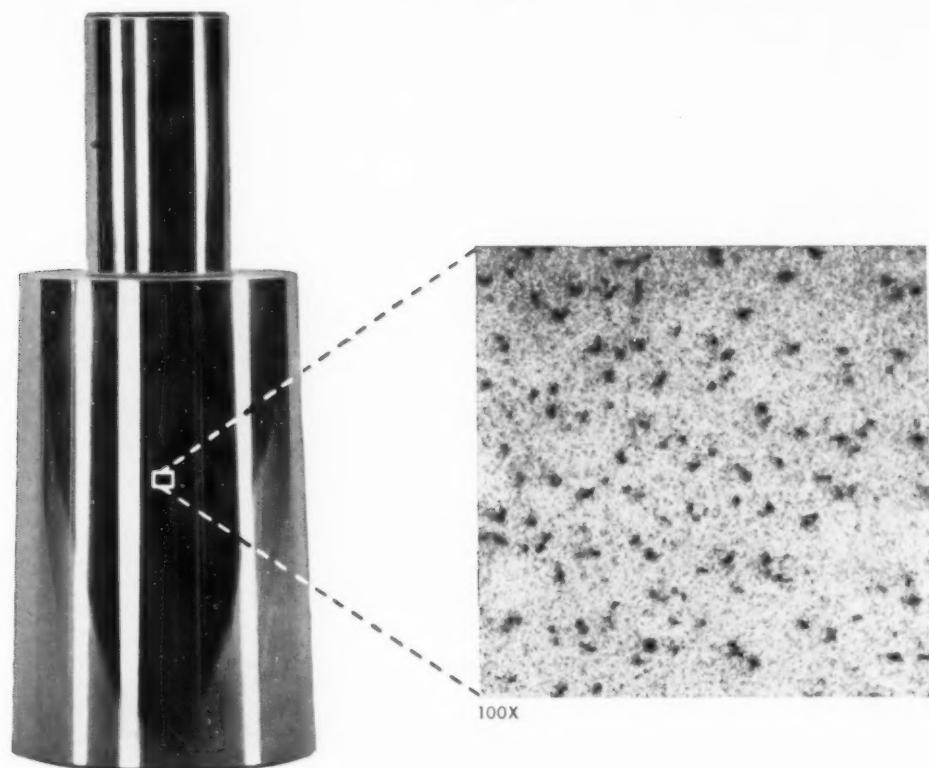
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A piece of polished Graph-Mo steel has a "graphitic look"—tiny, scattered, parallel marks barely visible on the surface. These marks are the result of free graphite in the steel's structure. And this free graphite, together with diamond-hard carbides, enables Graph-Mo to outwear other gage steels an average of 3 to 1. Reports from dozens of gage users who've switched to Graph-Mo prove it! (Details on request.)

The photomicrograph (above) shows the free graphite and diamond-hard carbides that give Graph-Mo its unusual wear resistance. They also minimize scuffing, pick

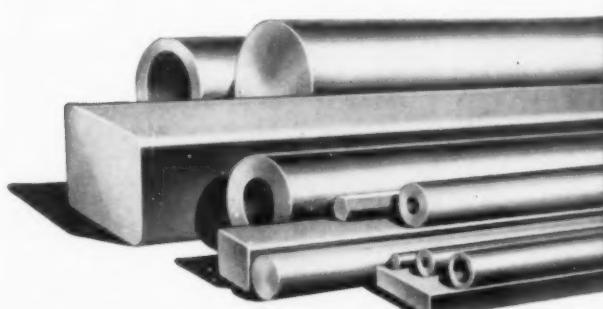
up and galling, and resist abrasion.

Tests prove that Graph-Mo is the most stable gage steel ever made, too! After a 12-year period, a typical Graph-Mo steel master plug gage showed less than .10 millionths of an inch change from its original measurement.

And constant-pressure machinability tests show Graph-Mo machines 30% faster than other gage steels. (Machinability test data on request.)

You can always tell Graph-Mo by its "graphitic look". This built-in "trade-mark", the result of the free graphite in its structure, can't be duplicated in other steels. Look for it, insist upon it, next time you buy gages. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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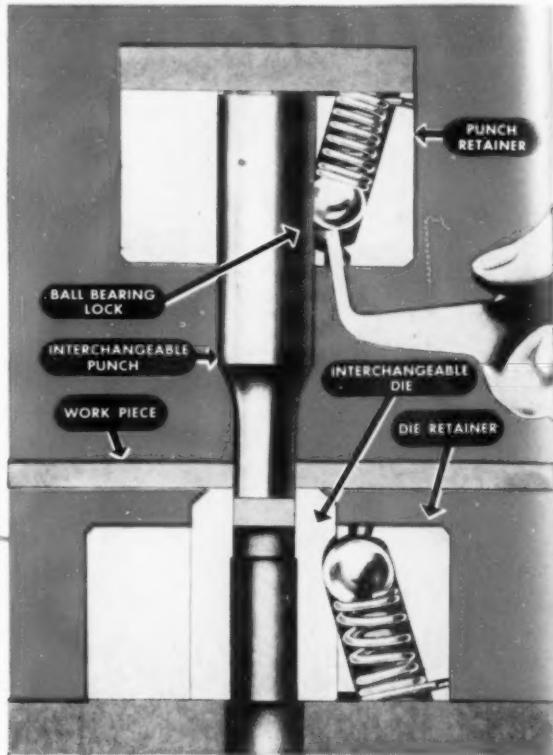


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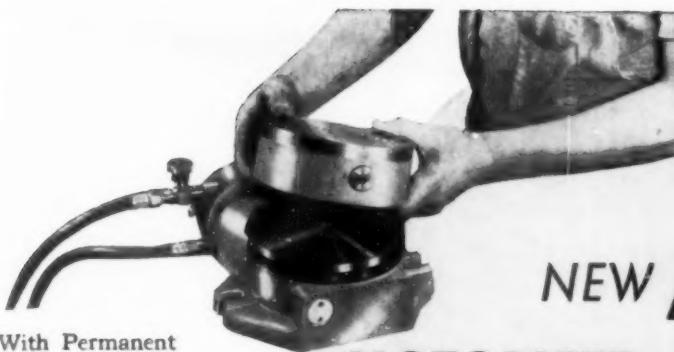
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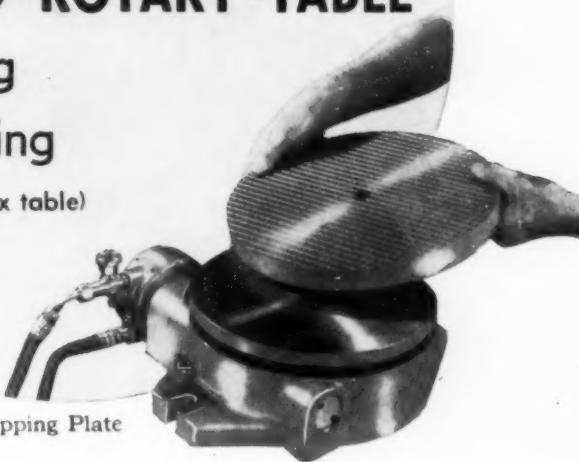


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Magnetic Chuck

NEW *Vulcan*

MOTORIZED ROTARY TABLE for lapping and grinding

(not an index table)

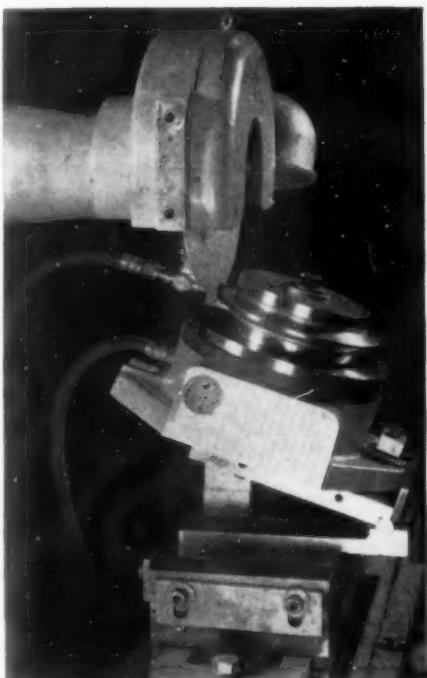


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FASTER

circular precision grinding!

Now with this table and with less effort you assure highest standards of accuracy, flatness, finish and close tolerances. At the same time you eliminate slow and complicated tool setups. You cut grinding time greatly by using only cross feed while the table is rotating at infinite speeds between 40 and 100 RPM.



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Surface grinder application.

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Vulcan's Rotary Table is an air operated, self contained unit, portable between bench or machine. A precision center hole for locating and tapped holes in the table for clamping provides easy setup. Circular surface grinder applications are many and varied — grind flanged studs or bushings — bearing spacers — forming rolls — cutters — convex or concave surfaces — punches or dies (radius or angle).

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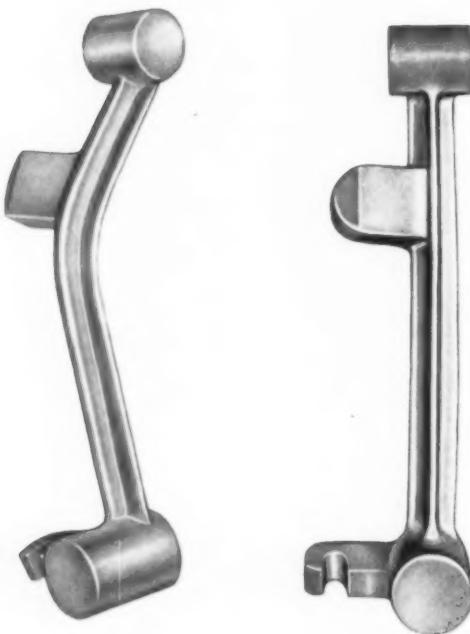
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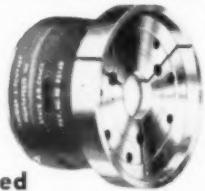
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AND...for electronically balancing, dynamically and kinetically, large units where it is impractical to remove the rotor, see the new Stewart-Warner Model 717 PORTABLE demonstrating the new High Intensity Stroboscope for determining speed of rotation of a part to be balanced without any contact with the rotating part.

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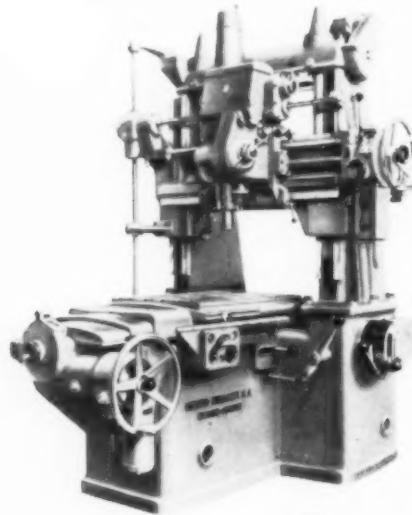
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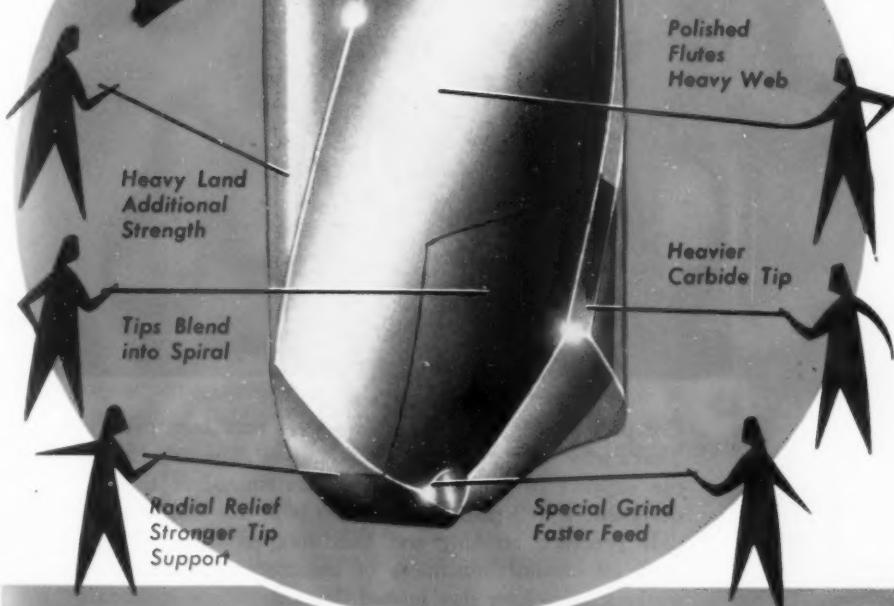
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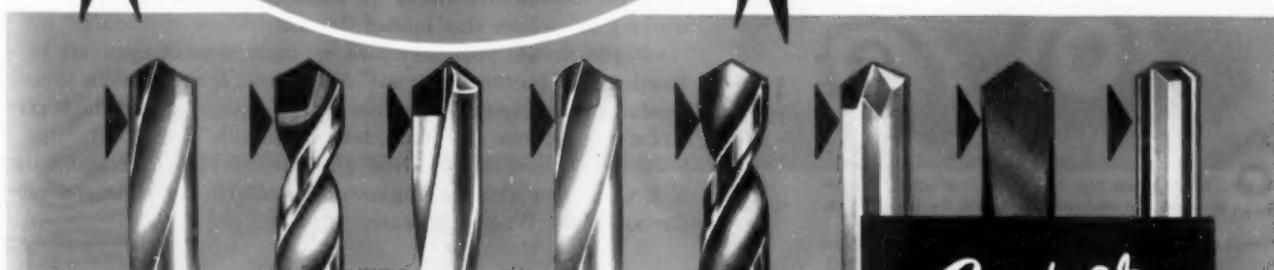
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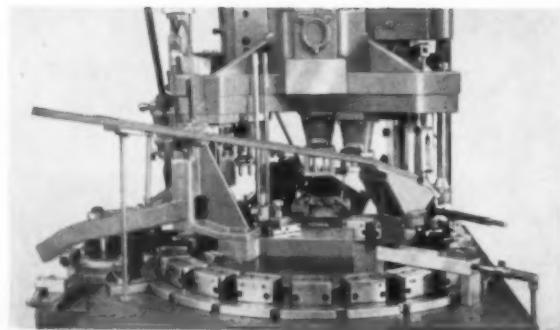
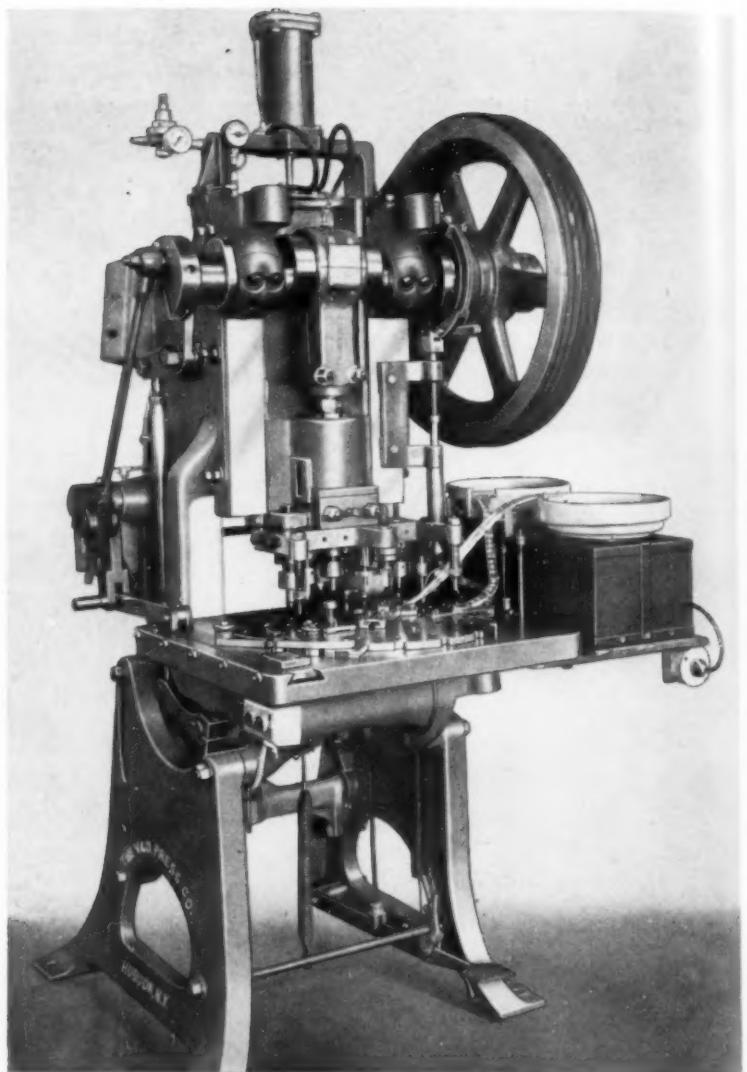
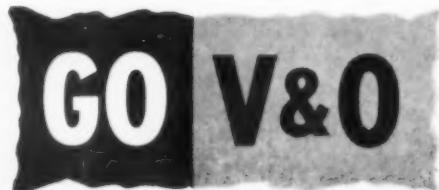
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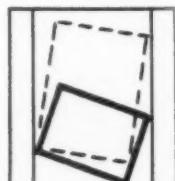
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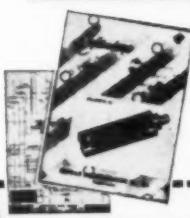
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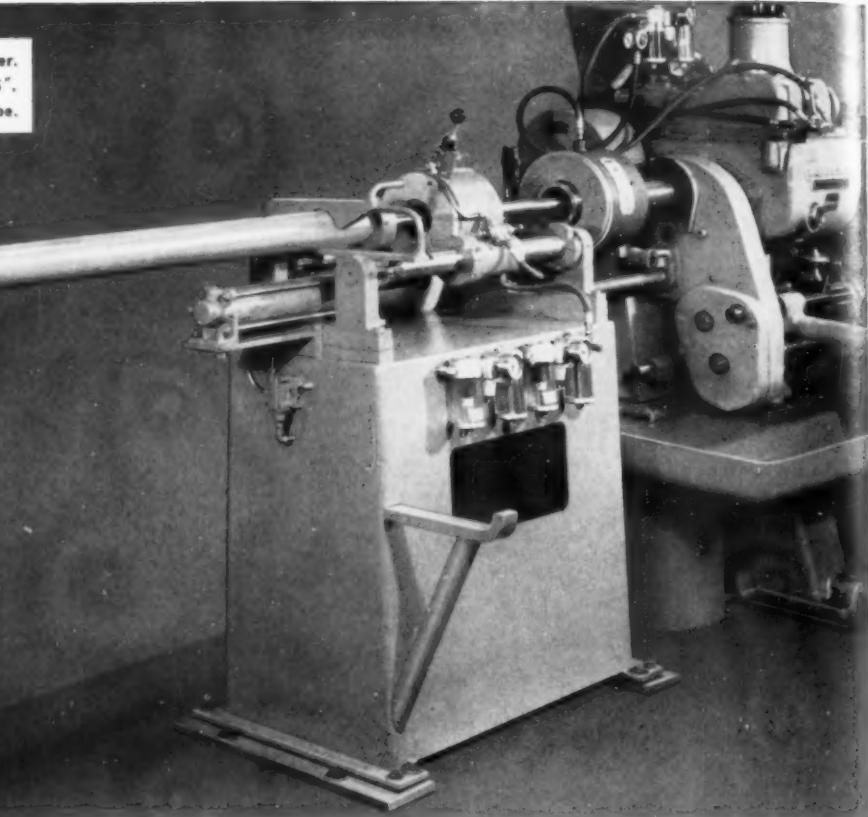
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AA-976



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AND FEATURES**

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9" swing over saddle

1 $\frac{1}{8}$ " spindle hole

1" collet capacity

40" between centers

Variable Speed Drive

Ball Bearing Spindle

38 to 1200 rpm

Two-V-way, Two-flat way

Precision Ground Bed

Precision Carriage

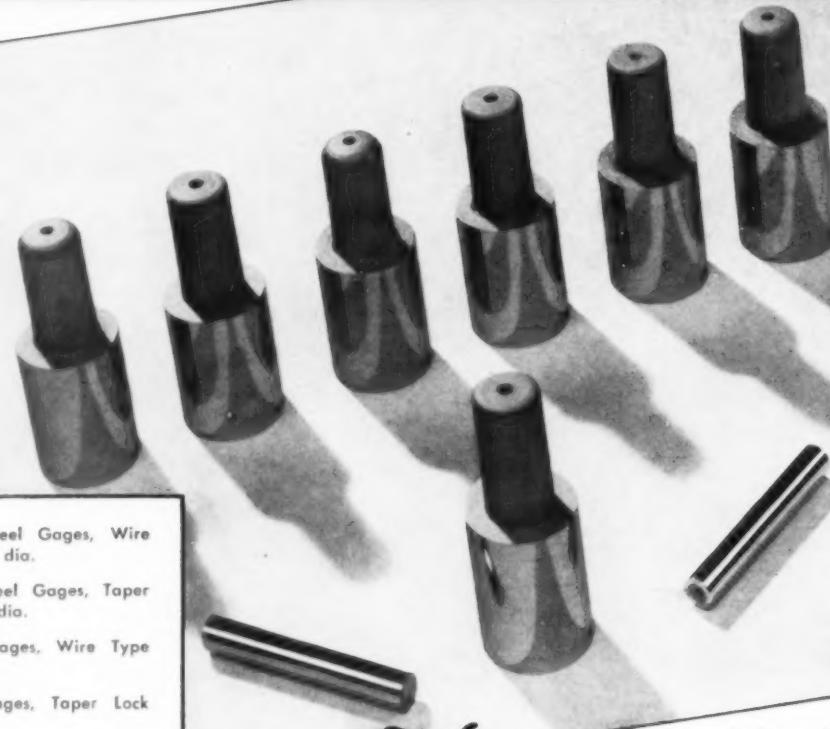
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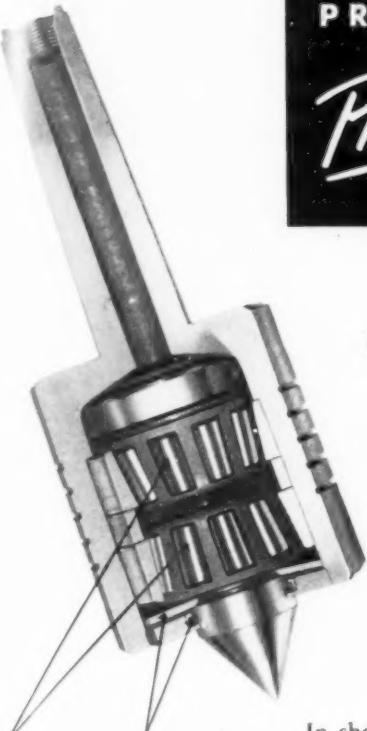
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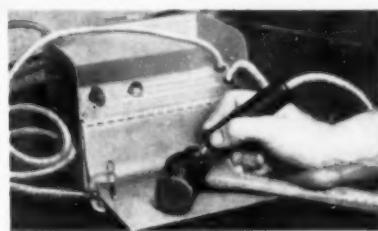
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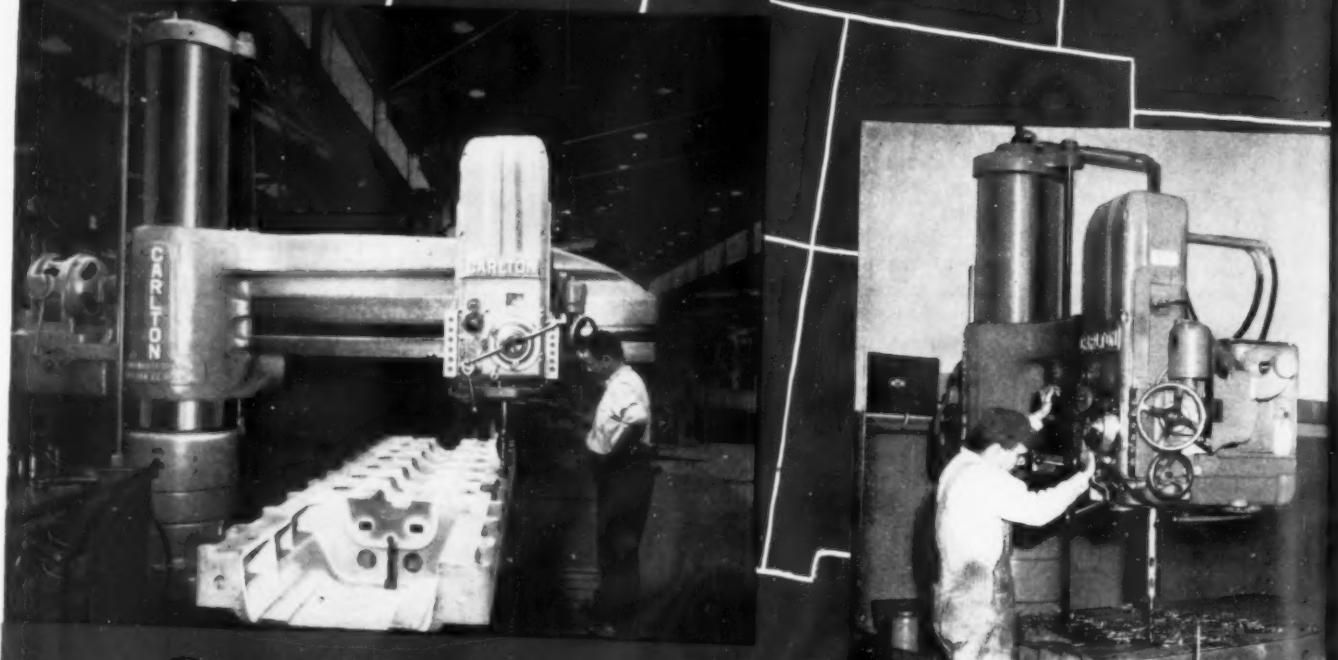


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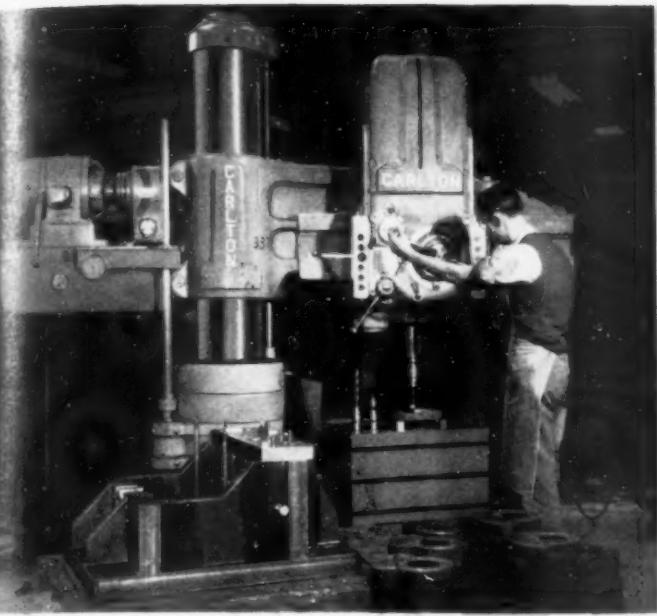


WEST

The huge Carlton 5A radial drill at Enterprise Division, General Metals Corp., San Francisco, can drill heavy work like this . . . yet can be used with equal success for smaller, more sensitive requirements.

SOUTH

National Supply Co., uses a Carlton 4A radial drill in their new Gainesville, Texas plant for drilling structures members of oil field pumping units.

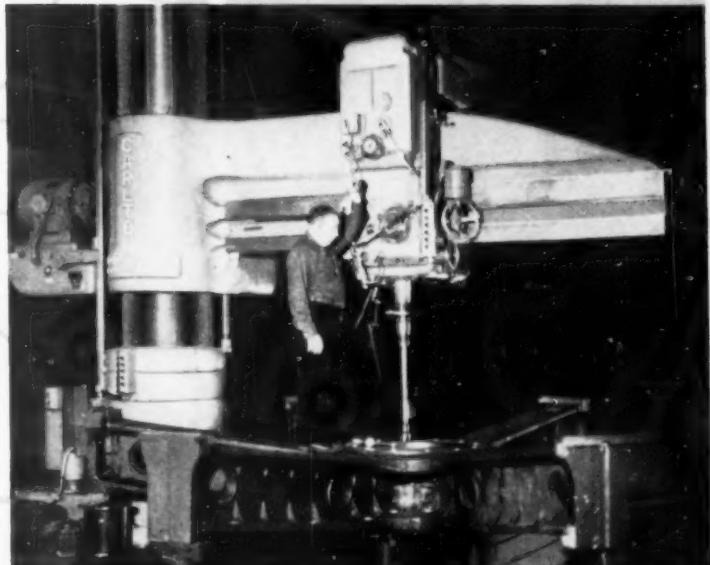


Carlton 3A radial drill machining a cam used on an automatic concrete block machine manufactured by the Besser Co., Alpena, Mich. Precision, rigidity and pushbutton control make Carlton first choice at Besser Co.

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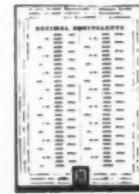
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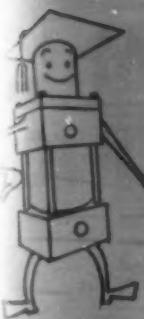
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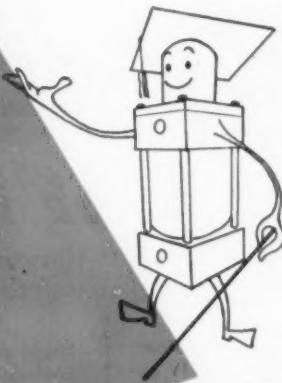
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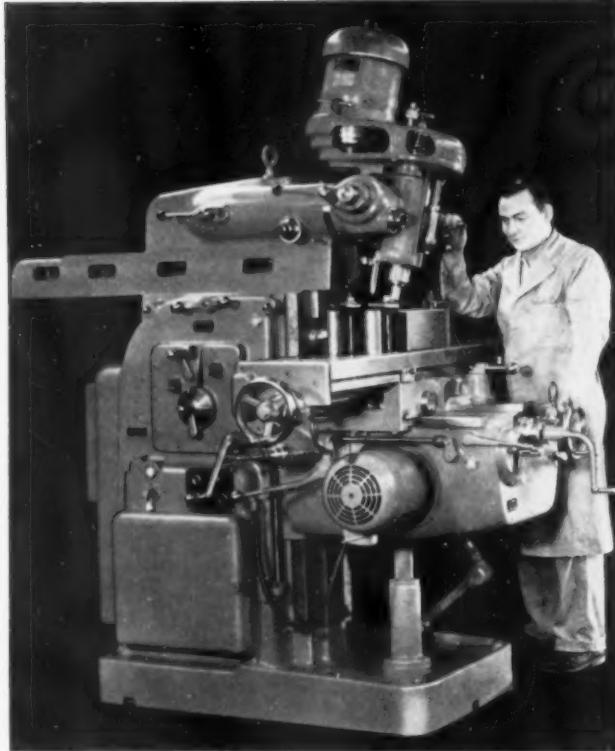
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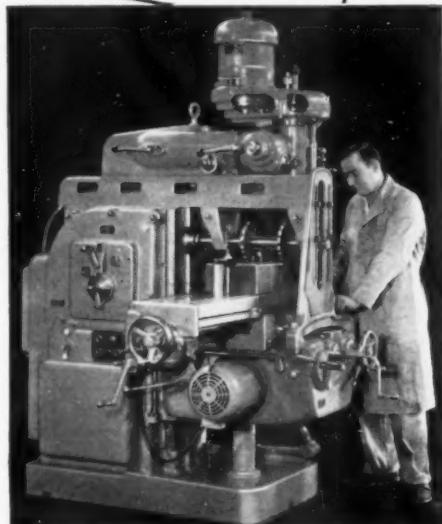
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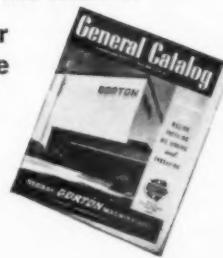
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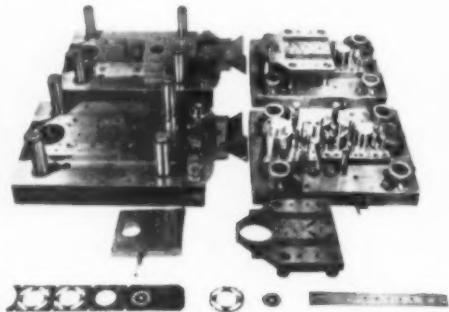
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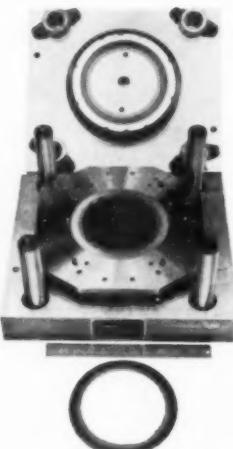
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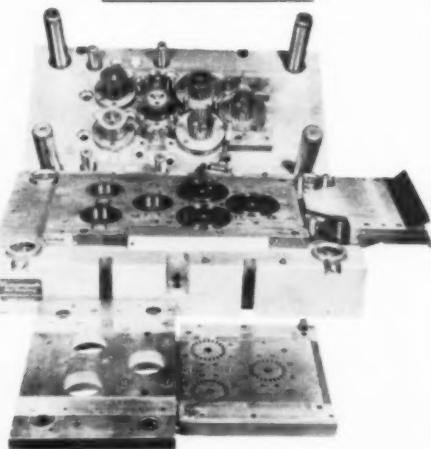
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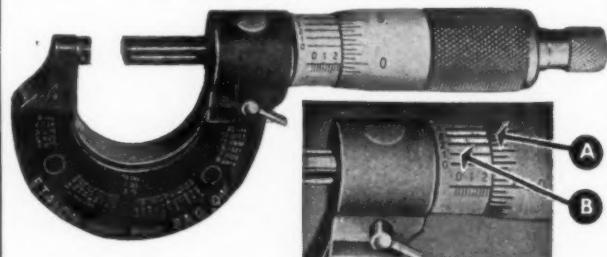
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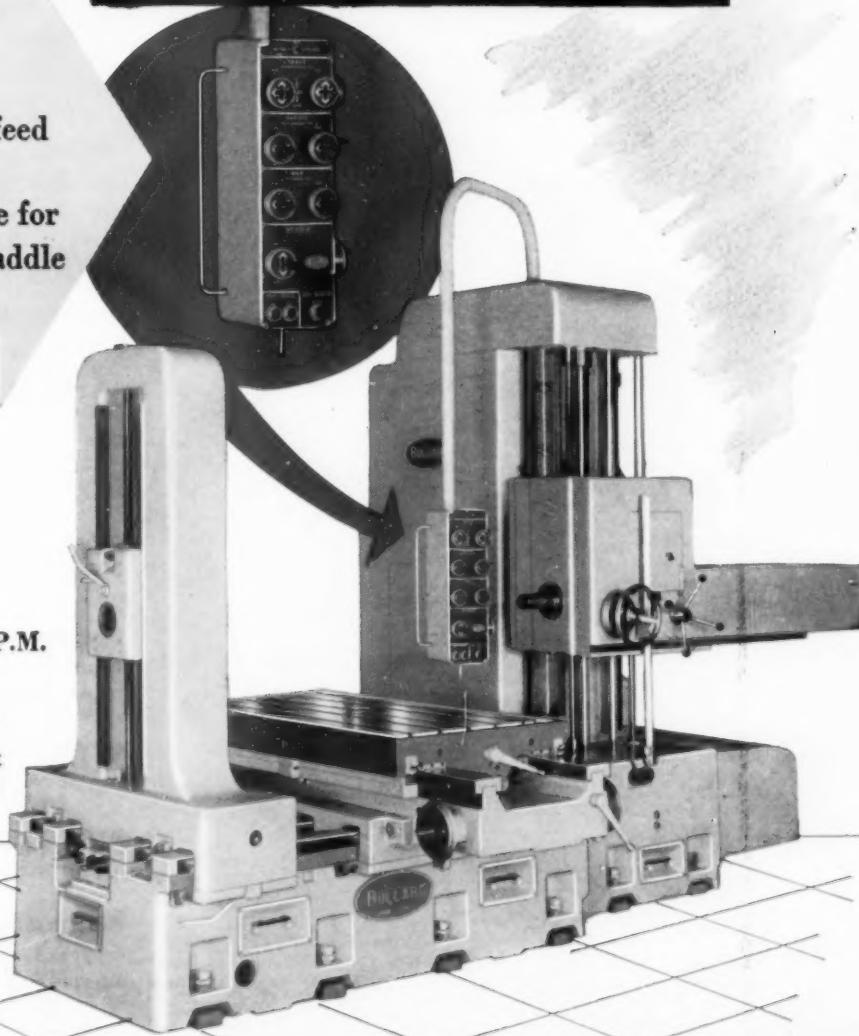
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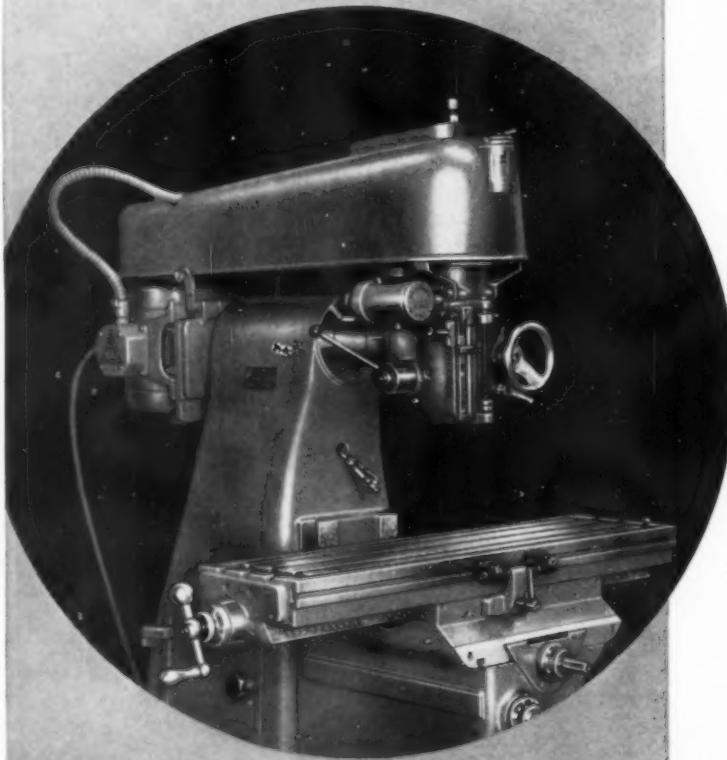
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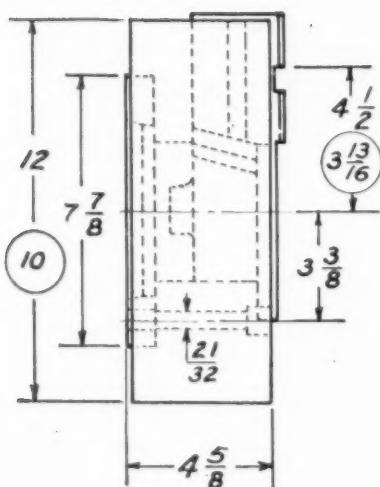
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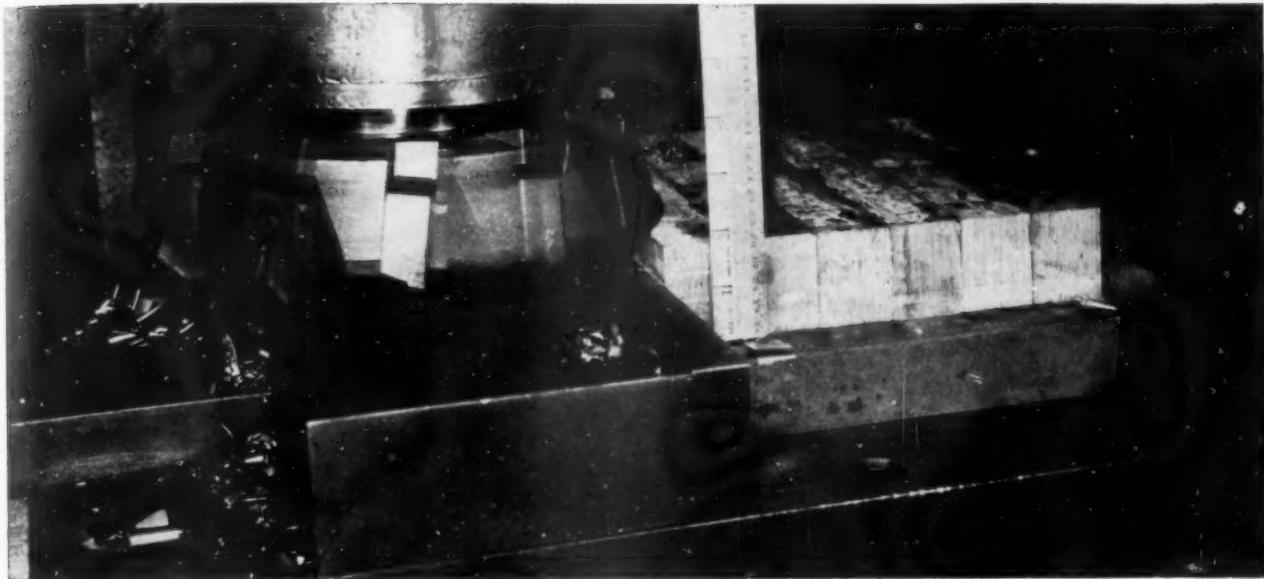
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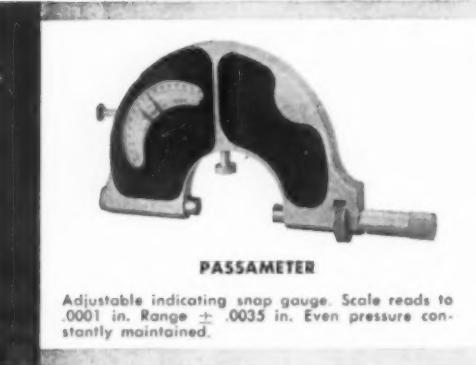
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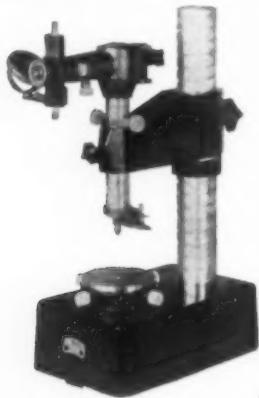
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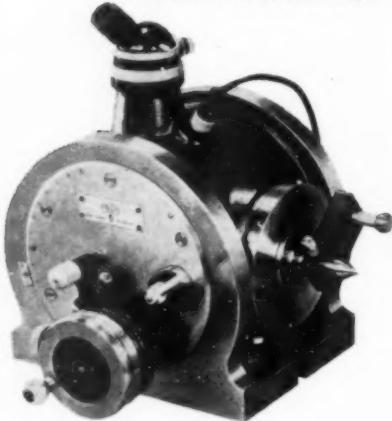


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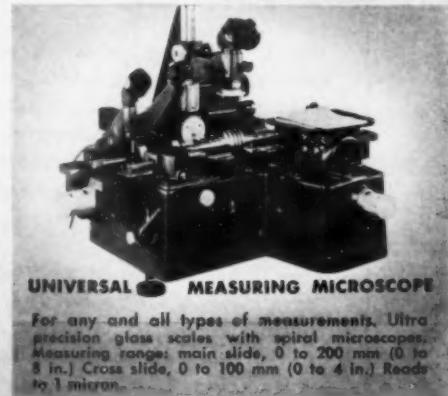
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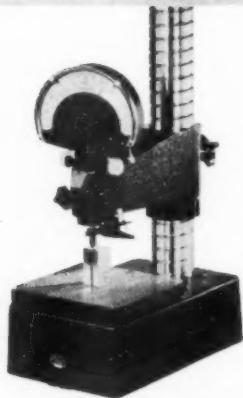
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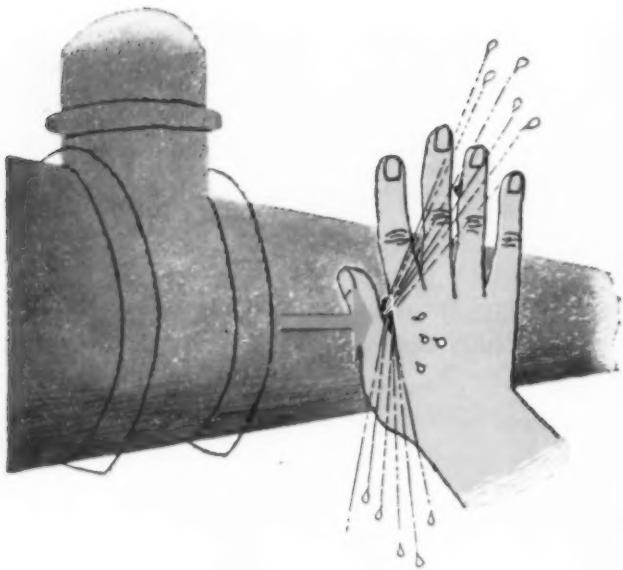
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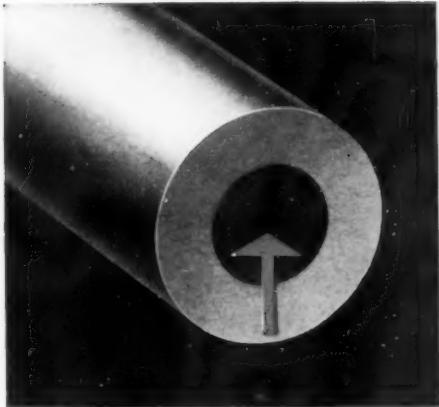


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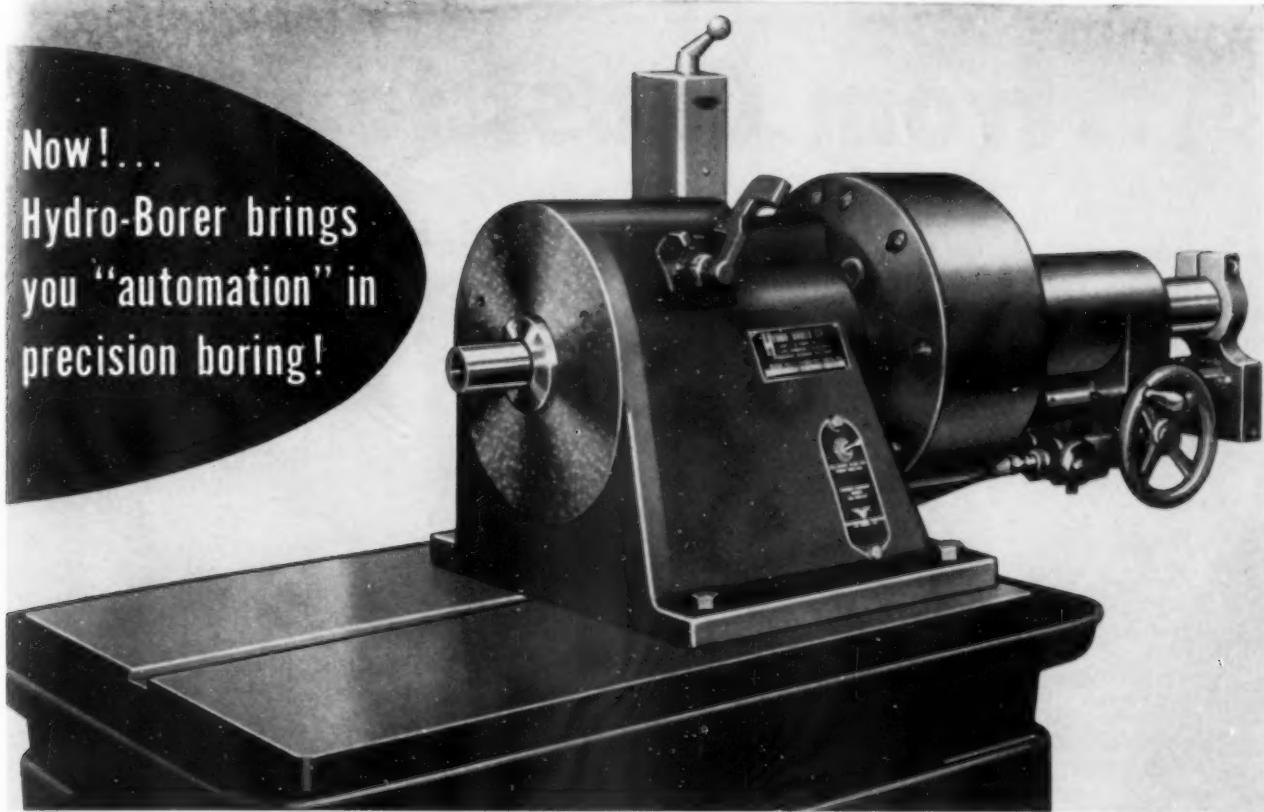
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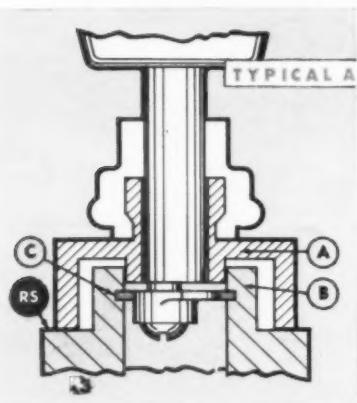
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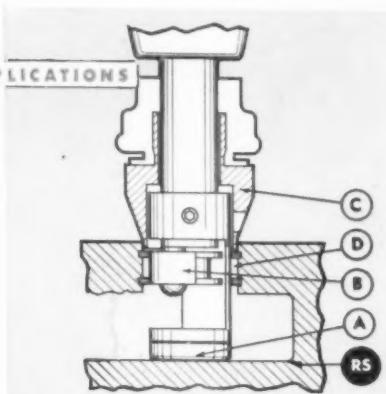
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Waldes Truarc Grooving Tool Out-Performs Conventional Recessing Tools

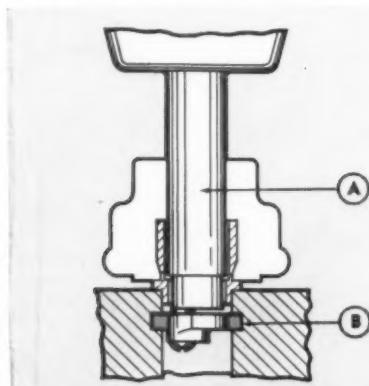
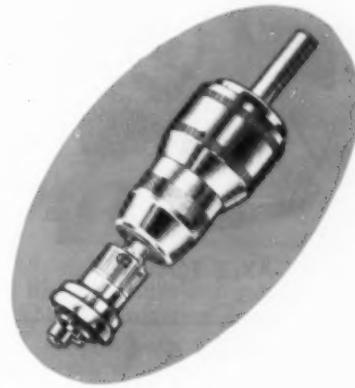
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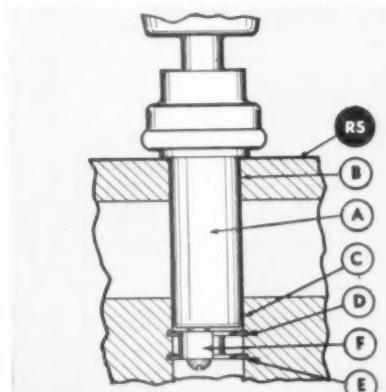
Clearing Obstructions or Protrusions — Waldes Truarc Grooving Tool with *special bushing* with high shoulder A in order to clear obstruction B on reference surface RS so groove can be properly located in bore.



Locating Grooves from Bottom of Hole or Blind Hole — Use of *bottom adaptor A* and double cutter B. Bushing C pilots tool into bore D while bottom adaptor acts as stop to locate grooves from reference surfaces RS below bore.



Small Diameter Bore — Need for Wide Groove — Great versatility of tools allows A-2 Tool to accept *stepped down spindle* and *cutter-shaft assembly A*. Provides cutting capacity in a bore normally within the range of smaller A-1 Tool. Illustrated, larger tool capacity necessary to cut groove diameter B exceeding normal capacity of standard A-1 Tool.



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MADE BY THE MANUFACTURERS OF WALDES TRUARC RETAINING RINGS.

WALDES KOHINOOR, INC., 47-16 Austel Pl., L.I.C.1, N.Y. Waldes Truarc Grooving Tool mfd. under U.S. Pat. 2,411,426



TE037

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Title _____

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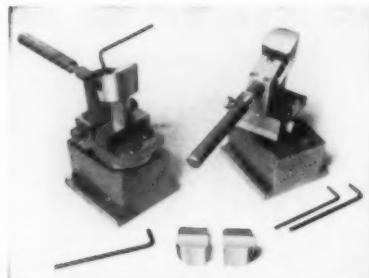
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APEX INSERTED-BLADE METAL-CUTTING TOOLS

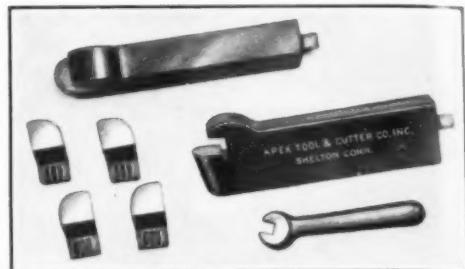
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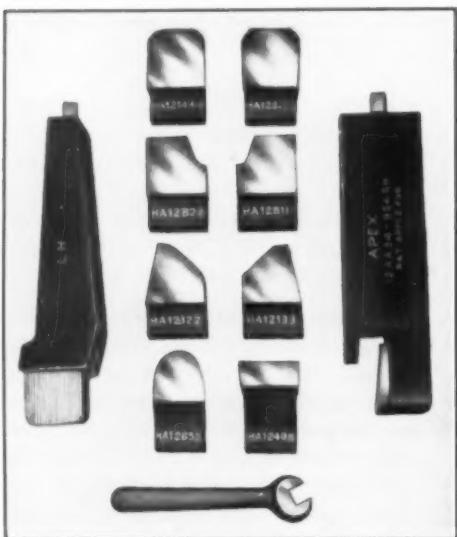
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AXLE TOOL RADIUS GRINDER



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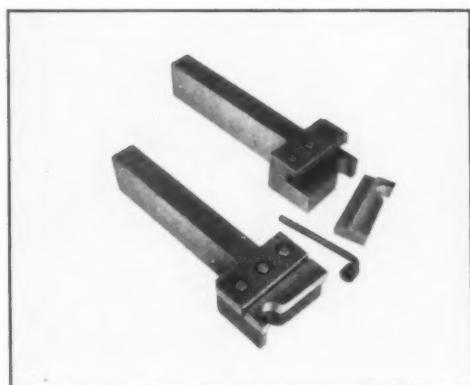
**TOOLS ARE DROP
FORGED OF HIGH
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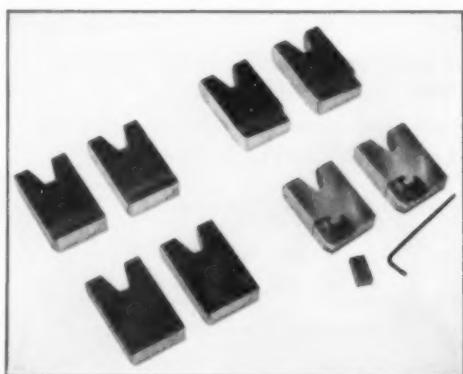
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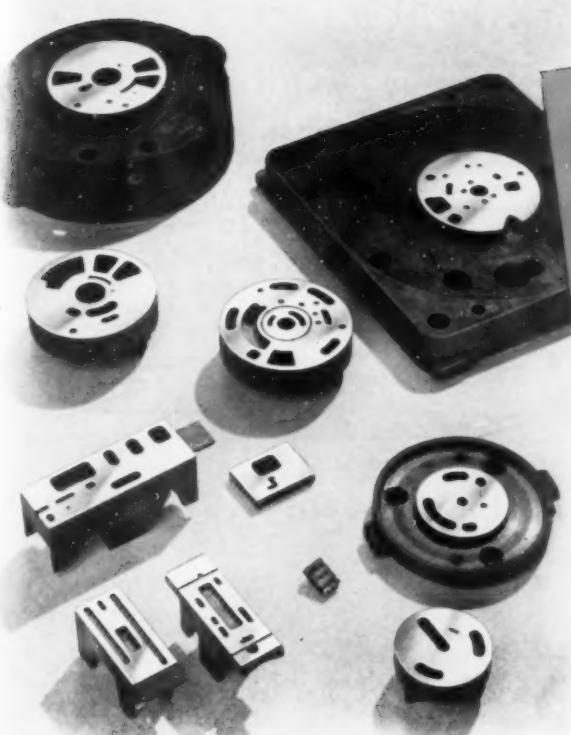


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and Parallelity on Valve Parts
Like These . . .
In Production Quantities
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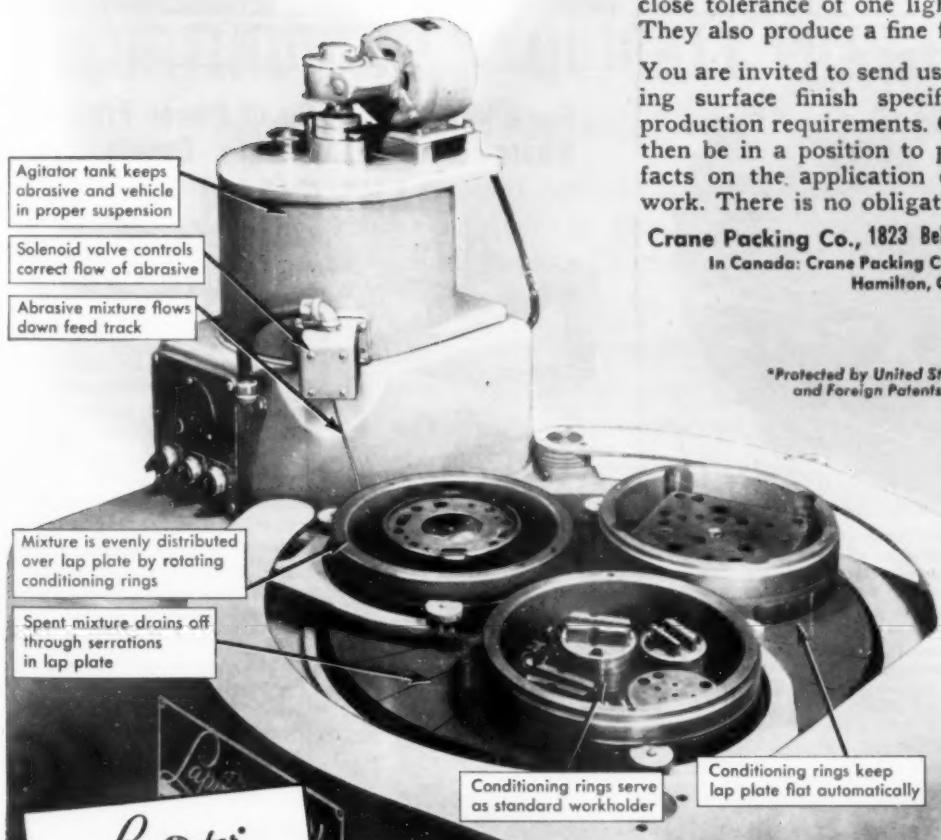
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DATA**

on the Lapmaster is available on request; also information on measuring flatness. Write for your copies today.

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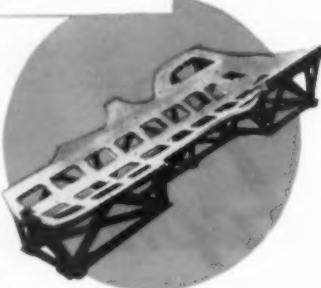
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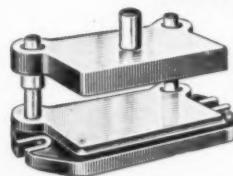
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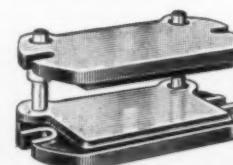
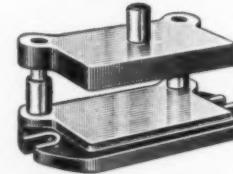
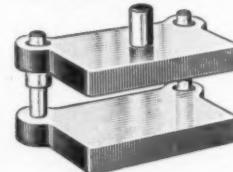
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For Light Work on Small Power Presses
Where Extreme Accuracy Counts . . .

DANNEMAN Precision DIE-SETS



Style "B"



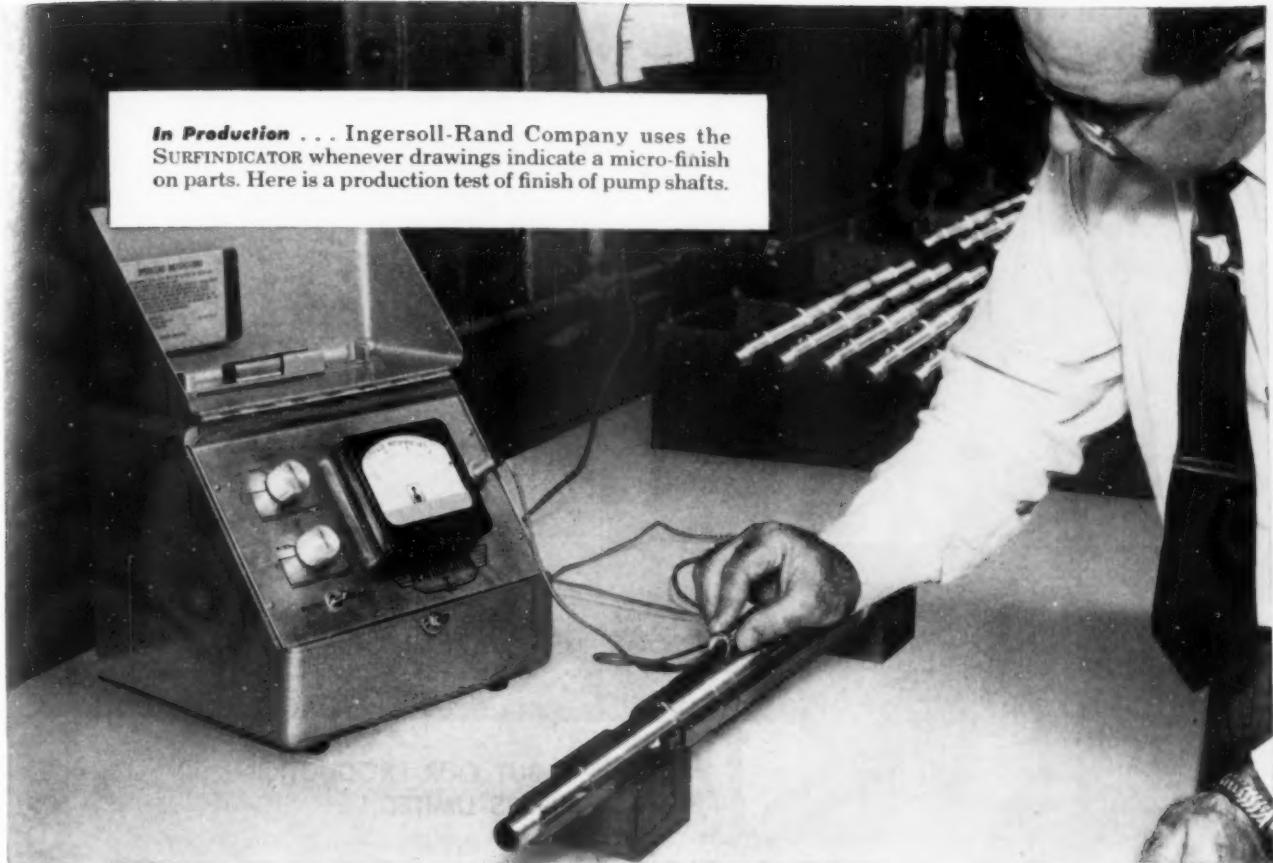
- Surfaces precision ground.
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Write for information!

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SURFINDICATOR* QUICKLY PAYS FOR ITSELF *through better surface finish control*

THIS MODESTLY PRICED instrument permits you to measure surface roughness quickly, easily, surely—in the shop. With simple checks of surface finish you can:

- ... speed up inspection, avoiding costly delays and arguments.
- ... reduce machining costs by eliminating unnecessary overfinishing.
- ... meet specifications exactly.

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Company _____

Address _____

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Holes on extremely close centers vary in diameter from $\frac{1}{16}$ " to $1\frac{1}{16}$ ". The valve body has 33; the cover, 18.



"—BUT OUR PRODUCTION
RUN IS LIMITED."

"SO WAS THE RUN ON THIS AUTOMATIC
TRANSMISSION PART, BUT". . . .



HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on

close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.



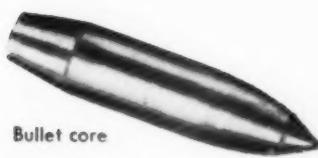
Ask on your letterhead
or Bulletin "E-3".

ZAGAR TOOL, INC.

24000 LAKELAND BOULEVARD • CLEVELAND 23, OHIO



TOOLS FOR INDUSTRY
and SPECIAL MACHINERY



Bullet core



Cap nut blank



Adjusting screw blank



Wheel stud

Valve

Cold extrusion is made practical, cold working of steel is more profitable with Pennsalt's Fos Process, a new method of locking a phosphate coating and lubricant onto a steel surface. Cold steel actually flows like putty when extreme pressures are applied. With Fos Process there is no breakdown of lubricants to cause seizing and galling. Die life increases . . . in one case by 666%!

Where can you use the Fos Process? In mass production of steel automotive and ordnance parts, in tube and wire drawing. Expensive steel alloys can often be replaced with

plain carbon steels. The combination of Fos Process and severe cold working upgrades the physical and metallurgical properties of the steel . . . cuts unit costs!

Look at these few parts carefully. Many more parts and shapes like these can be cold-extruded or cold-headed economically, with little finish machining, by using Pennsalt's new Fos Process. Call the specialist from Pennsalt for a complete survey of your production line. Often your blueprint can help him determine rapidly if the Fos Process is for your immediate use. Fill in the coupon . . . get all the facts now!

(SAVES TIME • METAL • LABOR)


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Chemicals**

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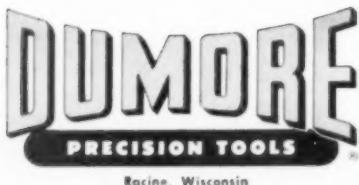
- Have Pennsalt specialist call.
- Send technical illustrated folder.
- Enclosed is blueprint . . . can I use Fos Process in mass-producing by cold extrusion?

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____



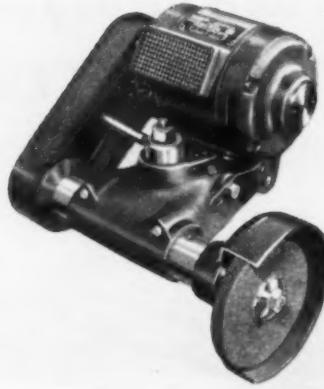
Racine, Wisconsin

Save production time and money!



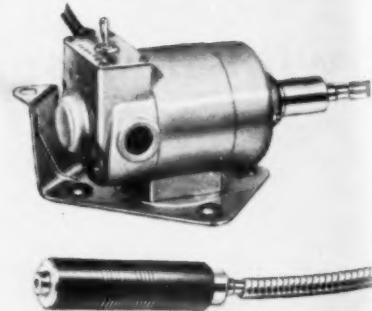
AUTOMATIC DRILL HEAD

Here's a real cost-cutter for users of small drills (No. 80 to $\frac{1}{8}$ "). Completely automatic, with self-contained air, and controlled feed and speed. Gives more production, less drill breakage, less scrap loss. Operates from any electric outlet. Heads may be operated singly, or in multiple groups. Mounting brackets and foot switch control available.



TOOL-POST GRINDERS

These job-proved, precision machines handle form and surface grinding, plus light milling . . . work to tolerances of $.0001"$ at production rates . . . cut your tool investment by working from existing tools or low-cost set-ups. 8 models from $1/16$ to 1 HP, plus interchangeable quills, give you wide work range. Speeds to 42,500 RPM . . . work depths to 24".



FLEXIBLE-SHAFT TOOLS

Here's handgrinder work capacity with extra control and maneuverability for hard-to-reach jobs — limited work space — close tolerance work. Small work head makes them ideal for multiple drilling set-ups. There is a size and type to meet every requirement—from $1/20$ HP to $1/4$ HP. Choice of handpieces, and chucks . . . speed-control rheostats.



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Dumore precision handgrinders are long-life, economy tools. Seven sizes from $1/20$ HP to $1/4$ HP. No. 9's furnished with straight or spade handles for rugged jobs. No. 35 where high speed (35,000 RPM) is required. No. 10's (2 or 3 bearing models), and No. 8 on lightweight production jobs: Duplex model for light, intermittent duty.



AUTOMATIC DRILL UNIT

A new tool to slash production costs. Unit has built-in controls for automatic drilling, tapping, spot-facing, and other allied operations. Drill sizes No. 60 to $\frac{3}{8}$ ". Extremely simple mounting reduces tooling costs. Air feed and retraction with optional hydraulic control; maximum 3" stroke; adjustable speeds from 700 to 7240 RPM; very low air consumption.



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For complete information

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OR CALL

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IN OPERATION! BOOTH 758**

**ASTE SHOW
LOS ANGELES.**

Check these AMAZING WALES Fabricator Time Studies



ELECTRONIC CHASSIS $12\frac{1}{2}'' \times 11\frac{1}{2}''$, with 118 holes and 4 notches was completed in only 32.45 minutes and subsequent pieces in 6.44 minutes.

A part of FARM EQUIPMENT, $72\frac{1}{2}'' \times 22''$ with 32 holes and nibbled cut out was finished including setup in only 12.01 minutes, subsequent pieces in 2.32 minutes.

AN AIRCRAFT part $7\frac{1}{2}'' \times 4\frac{1}{2}''$ with 15 holes and 1 notch was produced including setup in only 3.52 minutes and subsequent pieces in only 54 seconds.

Part of an ELECTRIC REFRIGERATOR $39\frac{1}{2}'' \times 8\frac{1}{2}''$ with 10 holes and 4 notches were fabricated including setup in only 5.61 minutes and subsequent pieces in only 37 seconds.

● How long would it take you to make a part similar to those shown above?

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593 Payne Ave., North Tonawanda, N. Y.
(Between Buffalo and Niagara Falls)

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AT THE ASTE WESTERN INDUSTRIAL EX-
POSITION IN LOS ANGELES, MARCH 14-18

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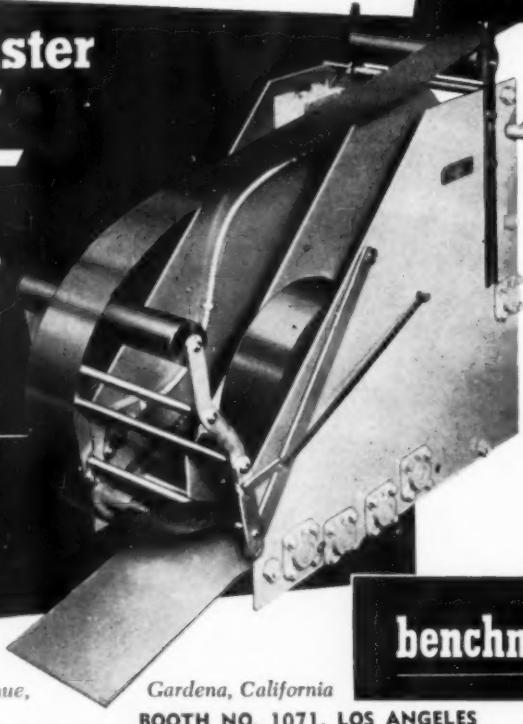
benchmaster

Koil-Kradle

with VARI-LOOP Control

MANY SIZES:

Capacities from $\frac{1}{2}$ ton to 8 tons, coil dia. 36" to 60" stock widths 10" to 48"



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BOOTH NO. 1071, LOS ANGELES

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benchmaster

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"LONGER LIFE BUILT IN!"

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Tap Holder
smaller, lighter,
more accurate,
taps close to
walls.

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THE ECCENTRIC WILL ACCURATELY CORRECT UP TO 1/16 MISALIGNMENT IN FACEPLATE OR MILLING MACHINE FIXTURES.

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PRODUCTION AIDS COMPANY

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The Tool Engineer

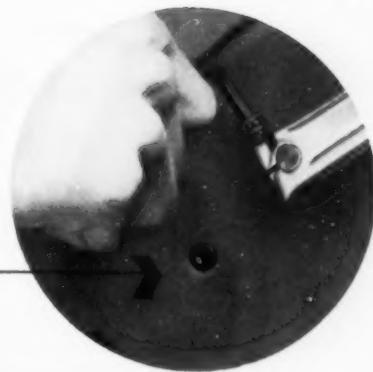


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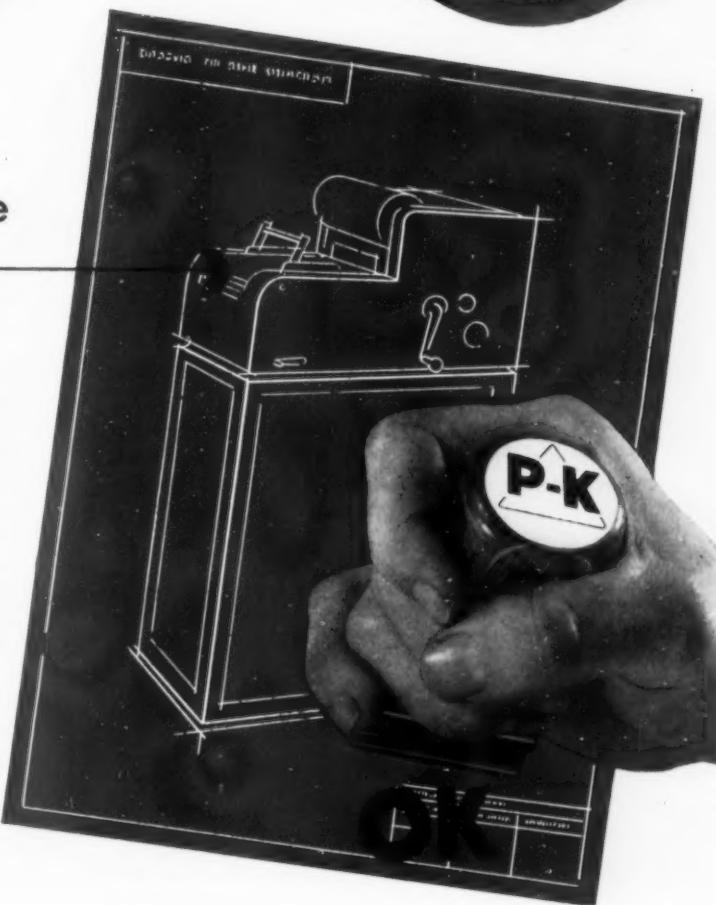
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in
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AMERICAN SOCIETY OF
TOOL ENGINEERS

10700 Puritan Ave. • Detroit 38, Michigan

Index of The Tool Engineer Advertisers

March 1955 Issue

The Index to Advertisers is published as a reader service. Although every precaution is taken to assure correct listing, no allowance will be made for error or omission.

Exhibitor in 1955 ASTE Western Industrial Exposition

A

Acme Broach Corp.....	202
Acme-Danneman Co., Inc., Dannehan Die-Set Division.....	386
Acme Industrial Co.....	198
Airborne Accessories Corp.....	194
Airmatic Valves, Inc.....	20
Alina Corp.....	370
*Allegheny Ludlum Steel Corp.....	377
Allen, Alva F.....	286
Allied Products Corp., Richard Brothers Punch Division.....	350
Allison Co., The, Division of American Chain & Cable Co.....	225
Aloris Tool Co.....	386
American Broach & Machine Co., Division of Sundstrand Machine Tool Co.....	60
American Chain & Cable Co., Allison Co., Division.....	225
Wilson Mechanical Instrument Division.....	235
*American Drill Bushing Co.....	13
American Machine & Foundry Co., Wahlstrom/Float-Lock Division.....	344
American MonoRail Co.....	342
*American Sip Corp.....	292
American Society of Tool Engineers.....	394
American Tool Works Co., The.....	12
*Ames, B. C., Co.....	180
Ames Precision Machine Works.....	286
Anderson, F. E., Oil Co.....	248-249
Anker-Holth Division, Wellman Engineering Co., A McDowell Enterprise.....	255
Apex Tool & Cutter Co.....	384
Armstrong-Blum Mfg. Co.....	204
Armstrong Bros. Mfg. Co.....	208
Atkins Saw Division, Borg-Warner Corp.....	315
Aviation Developments, Inc.....	304
Axelson Mfg. Co., Division of U. S. Industries, Inc.....	265
B	
Baird Machine Co.....	298
*Balas-Benco Collet Mfg. Co.....	398
Barber-Colman Co.....	278-279
Barnes Drill Co.....	178, 234
*Bath, John, Co., Inc.....	287
Baush Machine Tool Co.....	285
Bay State Abrasive Products Co.....	66-67
*Bellows Co., The.....	14-15
*Benchmaster Mfg. Co.....	392
Bethlehem Steel Co.....	57
Blake, Edward, Co.....	252
Boice Mfg. Co., Inc.....	284
Borg-Warner Corp., Atkins Saw Division.....	315
*Boyar-Schultz Corp.....	210
*Bristol Co., The.....	316
*Brush Electronics Co.....	387
*Buck Tool Co.....	375
Buhr Machine Tool Co.....	335
Bullard Co., The.....	373
*Burg Tool Mfg. Co.....	236
Butterfield Division, Union Twist Drill Co.....	299

User of ASTE Data Sheets

C

Cadmet Corp.....	352
*Carboloy, Department of General Electric Co.....	41-42-43-44
Card, S. W., Division Union Twist Drill Co.....	269
Cardinal Machine Co.....	220
Carlton Machine Tool Co., The.....	364-365
Cerro de Pasco Corp.....	286
Chicago Dial Indicator Co.....	366
Cincinnati Shaper Co.....	32-33
*Circular Tool Co., The.....	195
Clearing Machine Corp., Division of U. S. Industries, Inc.....	68
Cleveland Crane & Eng. Co., The.....	290
*Columbia International Corp.....	194
Columbia Tool Steel Co.....	214
Commander Mfg. Co.....	316
Commando Tool Co.....	370
Concentric Tool Corp.....	284
Consolidated Engineering Corp.....	190
Consolidated Machine Tool Corp.....	273
Continental Tool Works Division, Ex-Cell-O Corp.....	Inside Back Cover
Copperweld Mfg. Co., Ohio Seamless Tube Division.....	267
Cosa Corp.....	54
Coulter, James, Machine Co., The.....	314
Crane Packing Co.....	385
*Crodian & Co.....	352
Cross Co., The.....	70
Crucible Steel Company of America.....	63, 380
Crystal Lake Grinder Co.....	347
*Cushman Chuck Co.....	55

D

*Danly Machine Specialties, Inc.....	305, 347
Danneman Die-Set Division, Acme-Danneman Co., Inc.....	386
*Davis Boring Tool Division, Giddings & Lewis Machine Tool Co.....	318-319
Deltronic Corp.....	296
Denison Engineering Co., The.....	258, 302-303
Detroit Power Screwdriver Co.....	256
*Detroit Reamer & Tool Co.....	52
*Detroit Stamping Co.....	344
DeVlieg Machine Co.....	263
*Dickerman, H. E. Mfg. Co.....	184
*DoALL Co.....	35-36
*Dow Chemical Co., The.....	288
Dudeco Division, The New York Air Brake Co.....	203
duMont Corp., The.....	366
*Dumore Co., The.....	390
Dykem Co., The.....	280

E

Eastman Kodak Co.....	259
Eclipse Counterbore Co.....	201
Edlund Machinery Co.....	206
*Elox Corporation of Michigan.....	47
*Emhart Mfg. Co., V & O Press Division.....	358
*Engelberg Huller Co.....	192
Ercona Corp.....	378
Erickson Tool Co.....	360
Errington Mechanical Laboratory, Inc.....	322

Ex-Cell-O Corp.,
Continental Tool Works Division...Inside Back Cover

F

*Federal Products Corp.	293
Fellows Gear Shaper Co.	371
Firth-Sterling, Inc.	51
Foote-Burt Co., The	277
Foster Engineering Co.	280
Fuller Brush Co., The, Machine Division	222
*Furane Plastics, Inc.	244

G

Gaertner Scientific Co.	205
*Gairing Tool Co.	193
Gammans-Hoaglund Co.	296
♦ Gatco Rotary Bushing Co.	344
*General Electric Co., Carboloy, Department	41-42-43-44
Geometric Tool Company Division, Greenfield Tap & Die Corp.	17
*Giddings & Lewis Machine Tool Co., Davis Boring Tool Division	318-319
Gisholt Machine Co.	16, 45
Glenzer, J. C., Co.	310
Gorton, George, Machine Co.	368
Greaves Machine Tool Co.	223
Greenfield Tap & Die Corp., Geometric Tool Company Division	17
Greenlee Bros. & Co.	330
*Griswold, F. T., Mfg. Co.	386
Gulf Oil Co.	281

H

*Hammond Machinery Builders, Inc.	240
*Handy & Harman	213
♦ Hanna Engineering Works	325
Hannifin Corp.	10
*Hardinge Brothers, Inc.	11
Hassall, John, Inc.	366
Heald Machine Co.,	Inside Front Cover
Hill Acme Co., The	338
Hirschmann, Carl, Co., Inc.	356
*Hi-Shear Rivet Tool Co., The	296
*Horton Chuck	321
Howe & Fant, Inc.	219
Hutchinson, Wm. T., Co.	352
*Hydro-Borer Co.	381

I

*Ideal Industries, Inc.	363
Ingersoll Milling Machine Co., The	291
Ingersoll-Rand, Inc.	379

J

J & S Tool Co., Inc.	328
*Jacobs Mfg. Co.	237
Jahn, B., Mfg. Co., The	216
*Jarvis, Charles L., Co.	372
Jessop Steel Co.	53
Jones & Lamson Machine Co.	306

K

Kaufman Mfg. Co.	344
*Kearney & Trecker Corp.	289
♦ Keller Tool Co.	324
*Kenco Mfg. Co.	347
Kennametal, Inc.	30
♦ Kingsbury Machine Tool Co.	26-27
Kling Bros. Engineering Works.	247

L

*Landis Machine Co.	8-9
Lapeer Mfg. Co.	200
Lapointe Machine Tool Co., The	29
*Latrohe Steel Co.	39

*Lavallee & Ide, Inc.	23
Lawley Granite Surface Plate Co.	36
Lee, K. O., Co.	26
*Lees-Bradner Co.	1
♦ Lehigh Foundries, Inc.	27
Lepel High Frequency Laboratories	8
*Levin, Louis, & Son, Inc.	30
♦ Lincoln Electric Co.	16
*Lindberg Engineering Co.	332
Lipe-Rollway, Inc.	123
Littell, F. J., Machine Co.	314
Lobdell United Division, United Engineering and Foundry Co.	253
Loadding, Inc.	251
Logan Engineering Co.	361
*Lovejoy Tool Co., Inc.	386

M

Macklin Co.	311
Madison Industries, Inc.	268
Mallory, P. R., & Co., Inc.	266
Manhattan Rubber Division, Raybestos-Manhattan, Inc.	46
Master Mfg. Co.	218
Maxwell Co., The	185
*M-B Products	322
*MBI Export & Import, Ltd.	348
*McDonough Mfg. Co.	322
McKay Machine Co., The	40
Meehanite Metal Corp.	312-313
*Merrill Engineering Laboratories	352
*Merz Engineering, Inc.	270-271
Metal Carbides Corp.	334
Mettler Machine Co.	228
Meyers, W. F., Co.	304
♦ Michigan Drill Head Co.	38
Michigan Tool Co.	21
Micromatic Hone Corp.	340
*Milford Rivet & Machine Co., The	355
*Miller Fluid Power Co.	367
Milne, A., & Co.	272
*Modernair Corp.	34
Mohawk Tools, Inc.	215
Moline Tool Co.	187
Moore Special Tool Co.	191
Morse Twist Drill & Machine Co.	24-25
Morton Machine Works	182
*Motch & Merryweather Machinery Co., The	19

N

National Automatic Tool Co., Inc.	308-309
National Broach & Machine Co.	333
♦ National Twist Drill & Tool Co.	6-7
*Nelco Tool Co., Inc.	230
*New Standard Division, U. S. Expansion Bolt Co.	257
New York Air Brake Co., The	203
Niagara Machine & Tool Works	58-59
Nice Ball Bearing Co.	354
Nilson, A. H., Machine Co., The	224
Norton Co., Abrasive Grain Division	337

O

*Oakite Products, Inc.	227
*Ohio Crankshaft Co., The	317
Ohio Knife Co., The	345
Ohio Seamless Tube Division, Copperweld Mfg. Co.	267
O K Tool Co., Inc., The	339
♦ Ortman-Miller Machine Co.	359
Osborn Mfg. Co., The	48

P

Palley Supply Co.	280
-------------------	-----

Parker-Kalon Corp.	393
Parker-Majestic, Inc.	65
Parker Stamp Works	254
Pennsylvania Salt Mfg. Co.	389
Pioneer Broach Co.	286
Pioneer Eng. & Mfg. Co.	182
Pittsburgh Tool Steel Wire Co.	331
Pope Machinery Corp.	188
Potter & Johnston Co., Pratt & Whitney Division.	
Niles-Bement-Pond Co.	261
Precision Tool & Mfg. Co.	214
Procurier Safety Chuck Co.	392
Production Aids Co.	392
Production Specialties, Inc.	310

Q

Quality Tool Works	310
--------------------	-----

R

R and L Tools, Inc.	353
*Rankin Brothers, Inc.	280
Raybestos-Manhattan, Inc., Manhattan Rubber Division.	46
*Ready Tool Co.	242
Rehnberg-Jacobson Co.	327
Reid Brothers Co., Inc.	243
*Reliant Industries, Inc.	207
Ren-It Plastics, Inc.	386
*Rezolin, Inc.	229
Richard Brothers Punch Division, Allied Products Corp.	350
*Richards, J. A., Co.	370
*Rimat Tool Co.	314
Ring Punch & Die Co.	196
Rivett Lathe & Grinder Co., Inc.	28
Rotor Tool Co., The.	221
Russell, Holbrook & Henderson, Inc.	297
Ruthman Machinery Co., The.	244

S

*Sales Service Machine Tool Co.	179
Scherr, Geo., Co., Inc.	274
*Scully-Jones & Co.	300-301
*Seibert & Son, Inc.	245
Seneca Falls Machine Co.	294-295
*Service Machine Co.	229
*Sheffield Corp., The	49
Sheldon Machine Co.	211
*Simonds Abrasive Co.	61
*Simonds Saw & Steel Co.	369
Snow Mfg. Co.	323
Snyder Tool & Engineering Co.	22-23
South Bend Lathe Works.	209
*S-P Mfg. Corp.	241
*Standard Gage Co., Inc.	4-5
*Standard Parts Co.	233
*Standard Pressed Steel Co.	320
Standard Tool Co.	37
Staples Tool Co.	326
*Starrett, L. S., Co., The.	56
*Steel City Testing Machines, Inc.	199
Sturdy Broaching Co.	304
Sturtevant, P. A., Co.	274
Sun Oil Co.	2
Sundstrand Machine Tool Co.	282-283
Sundstrand Machine Tool Co., American Broach & Machine Co., Division.	60

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*Super Tool Co.	357
*Syntron Co.	246

T

Taft-Peirce Mfg. Co., The	62
*Taylor Dynamometer and Machine Co.	209
Threadwell Tap & Die Co.	275
Thunder Bay Mfg. Co.	197
Timken Roller Bearing Co.	349
*Tomkins-Johnson Co.	226
Torrington Co., The	336
Twentieth Century Mfg. Co.	251

U

Uddeholm Company of America, Inc.	307
-----------------------------------	-----

Union Twist Drill Co.	
-----------------------	--

Butterfield Division	299
----------------------	-----

S. W. Card Division	269
---------------------	-----

Union Division	329
----------------	-----

United Engineering and Foundry Co.	
------------------------------------	--

Lobdell United Division	253
-------------------------	-----

United States Rubber Company	376
------------------------------	-----

U. S. Burke Machine Tool Division	374
-----------------------------------	-----

U. S. Drill Head Co.	260
----------------------	-----

*U. S. Expansion Bolt Co.	
---------------------------	--

New Standard Division	257
-----------------------	-----

U. S. Industries, Inc.	
------------------------	--

Axelson Mfg. Co., Division	265
----------------------------	-----

Clearing Machine Corp., Division	68
----------------------------------	----

*U. S. Tool Co., The	50
----------------------	----

Universal Engineering Co.	276
---------------------------	-----

V

*V & O Press Co., The	
-----------------------	--

Division of Emhart Mfg. Co.	358
-----------------------------	-----

Valenite Metals Corp.	346
-----------------------	-----

Valvair Corp.	341
---------------	-----

*Van Keuren Co.	362
-----------------	-----

Vanadium-Alloys Steel Co.	343
---------------------------	-----

*Vascoloy-Ramet Mfg. Corp.	238
----------------------------	-----

Verson AllSteel Press Co.	Back Cover
---------------------------	------------

Vulcan Tool Co.	264, 274, 351
-----------------	---------------

W

Wahlstrom/Float-Lock Division	
-------------------------------	--

American Machine & Foundry Co.	344
--------------------------------	-----

*Walde Kohinoor, Inc.	383
-----------------------	-----

*Wales-Strippit Corp.	391
-----------------------	-----

Walker, O. S., Co., Inc.	189
--------------------------	-----

Waukesha Tool Co.	284
-------------------	-----

*Webber Gage Co.	250
------------------	-----

Wellman Engineering Co.	
-------------------------	--

Anker-Holth Division	
----------------------	--

A McDowell Enterprise	255
-----------------------	-----

Wesson Co.	176
------------	-----

*Whistler, S. B., & Sons, Inc.	212
--------------------------------	-----

Wiedemann Machine Co.	262
-----------------------	-----

Wilson Mechanical Instrument Division,	
--	--

American Chain & Cable Co.	235
----------------------------	-----

Wilton Tool Co.	246
-----------------	-----

*Winter Brothers,	
-------------------	--

Division of National Twist Drill & Tool Co.	6-7
---	-----

Woodson Tool Co.	280
------------------	-----

Woodworth, N. A., Co.	382
-----------------------	-----

Y

Yoder Co., The	64
----------------	----

Z

Zagar Tool, Inc.	388
------------------	-----

Ziegler, W. M., Tool Co.	316
--------------------------	-----

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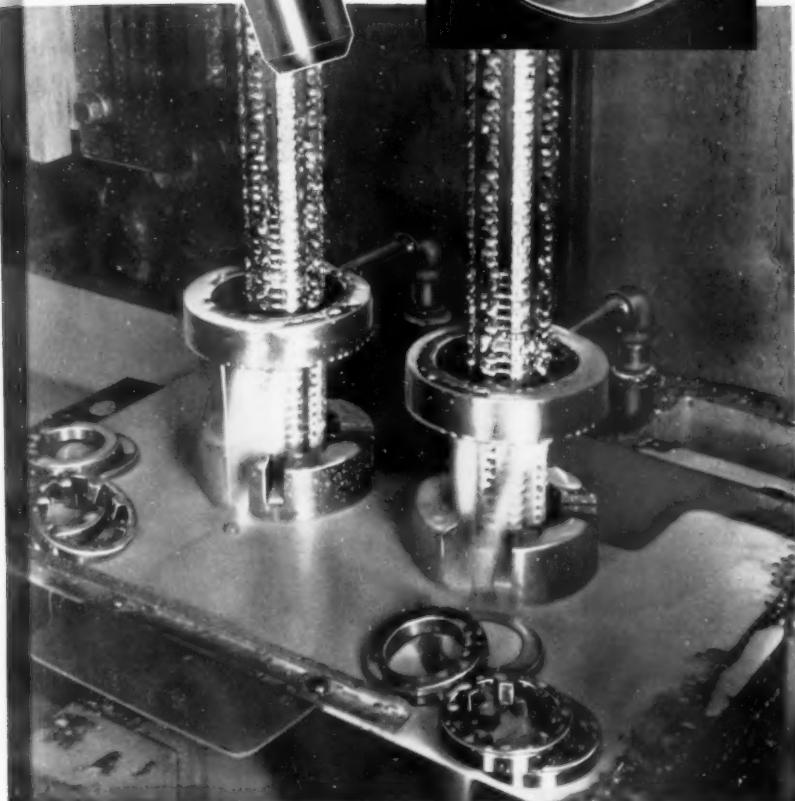
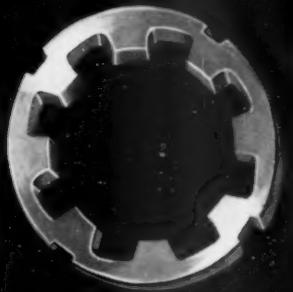
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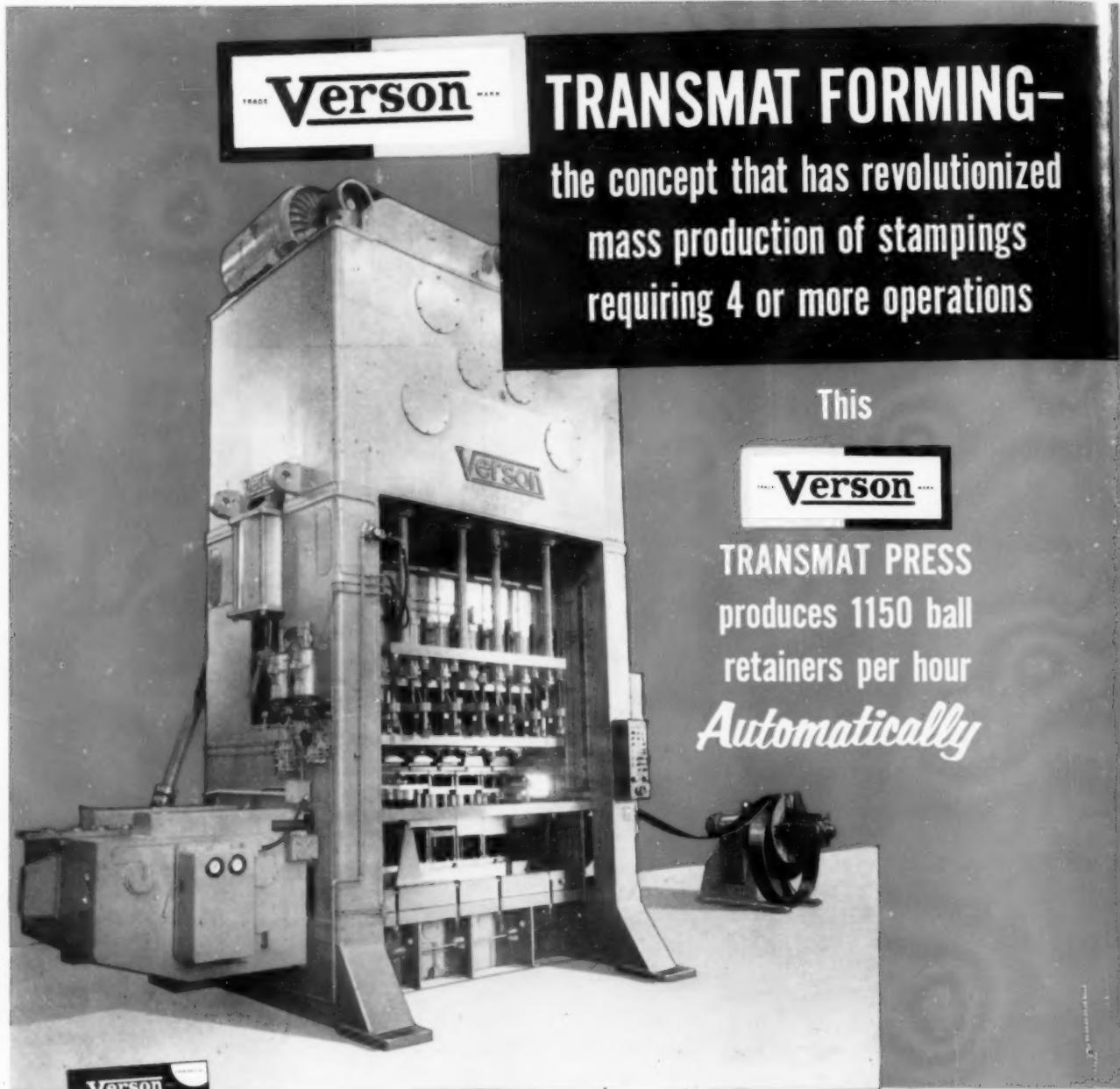
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